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Raw Materials and History

IN our issue of April 23, we called attention to the report of the Raw Materials Committee of the League of Nations and to the necessity for solving the problem of the accessibility of raw materials and of ensuring that all manufacturing countries could have supplies on equal terms. The problem would have no significance in a tranquil world, because the peaceable nations would always be prepared to let other nations, of whose peaceable intentions there was no question, purchase raw materials on equal terms at the country of supply; transport, of course, might cause inequalities of cost at the point of consumption, but that is another story.

Dr. C. B. Kingston in his presidential address to the Institution of Mining and Metallurgy developed the theme that much of modern history might be expressed in terms of minerals and that civilisation could not have reached its present high level without a constant and almost unlimited supply—nor, we might add, without constant research into the best methods of utilisation. However anxious a country might be to become self-contained, it could not escape its dependence upon others for a supply of the materials it lacked.

Dr. Kingston ascribed the dominance of peoples living about the North Atlantic, not only to their virility but also to their control of raw materials with which was associated the control of the sea. Germany's great industrial development came after she had obtained control of the iron mines of Lorraine in 1870. The invasion of Belgium in 1914 was ascribed by Dr. Kingston, though hardly with complete justification in our view, to the desire to possess the accumulated stocks of minerals of that country. He also believed that Japan's attack on China was the expression of the desire to possess great deposits of high-grade coal to be used in the development of the mineral resources of Manchuria and Korea. Here, again, Dr. Kingston's interpretation is not altogether unquestionable. The peculiar position exists in Japan that one family owns most of Japanese industry, and that apart from a small wealthy class the Japanese as a whole are poor.

It has been suggested by another authority that the Chinese war is being financed wholly by this wealthy clique—and it is difficult to see from what other source finance could be obtained—with the idea that when (and if) Japan succeeds in dominating China, the owners of Japanese businesses will increase their potential markets by the millions of Chinese. Perhaps that explains why no one in Japan seems to worry how much material damage is caused in China. This interpretation is on a par with the old dictum that "trade follows the flag." That may be true, but on the other hand, the great colonising nations know that colonies require vast sums of money expending upon them, and that when they subsequently become self-supporting, the next step is—quite properly—Dominion status, and with it a movement to produce as much as possible at home to develop the welfare of the new nation. It may have been true a couple of generations ago that "trade follows the flag," but to-day it is a dangerous half-truth.

Most reasonable people who think about it at all must distrust the modern movement for industrial self-sufficiency. Self-sufficiency can never be economic. There must always be materials, or manufactured goods which can be procured more cheaply or of better quality from abroad than in one's own country, and many of the ventures projected or under weigh in various countries cannot by any stretch of the imagination be called economic. Why are they being undertaken? In this country and in America we have not undertaken any state-aided uneconomic manufactures and we do not propose to do so. An exception should perhaps be made in the case of synthetic oil production from coal, but it is to be noted that the quantity of oil produced by hydrogenation is very small compared with our annual requirements, and we do not propose to increase substantially the annual quantity made in this country.

Democratic countries have a deep suspicion of the doctrine of self-sufficiency. It is the negation of free international trade and, apart from other reasons, can only keep nations farther apart; whereas it is the pressing need of our times that industrialists should be allowed to make friendly contacts through the medium of an ever-expanding international trade. If Dr. Kingston's view of the Sino-Japanese war is correct, how much better than the politicians could the industrialists have achieved the same object! A trade agreement between China and Japan would have enabled Japan to have bought all the coal she needed.

> *Improved results in the future must be dependent upon an improvement in the volume of trade, and this again depends very largely upon the extent to which we can rely upon the good offices of the Government in securing fair opportunities for our trade in world markets.*
>
> —*Sir Alan Skyes at general meeting of the Bleachers' Association, Ltd.*

Notes and Comments

The Annual Report on Alkali, etc., Works

IN his report for 1937 on alkali, etc., works, the chief inspector, Mr. W. A. Damon, remarks on the increased prosperity of the chemical trade during the past two years, caustic soda, sodium carbonate and sulphuric acid, traditional barometers of the state of the trade, being in good demand. In certain classes of manufacture the tendency towards plant centralisation, accompanied usually by increased production, has continued, it being particularly noticeable in the cases of ammonium sulphate and sulphuric acid. It is mentioned that a welcome feature of the year has been a revival of trade in South Wales with increased demands for coal and steel. Recovery in the Scottish chemical industry has followed on broad lines that of England and Wales, according to a separate report of the chief inspector for Scotland. Substantial increases in ammonium sulphate and tar production in gasworks and coke ovens have been registered. Reference is made to the unfortunate circumstance of the serious decline in the manufacture of iodine from kelp in Scotland. In fact no iodine whatever was manufactured during last year, as the low price commanded by that commodity rendered manufacture economically impossible.

Reduction of Atmospheric Pollution

THE main bulk of Mr. Damon's report is concerned with investigations of cases of atmospheric pollution through smokes and fumes and with means by which these troubles may be overcome. Regret is expressed that little action has been taken towards the establishment of new regional committees to deal with smoke abatement, although negotiations for setting up a regional committee of local authorities for Greater London have been undertaken and a similar proposal for the Bristol-Bath district is under consideration. The advantages of organisation and co-operation enjoyed by such committees, particularly if they are supported by a trained staff of smoke inspectors, are stressed. It is seen from the report that the cases of atmospheric pollution inquired into during 1937 were of varied type, with a high proportion relating to grit emission from boiler installations, coal and coke grading plants, and from the handling of pulverised fuel. We give on another page extracts from the report dealing mainly with atmospheric pollution inquiries arising from alkali and copper (wet process) works, cement production, smelting works, and sulphuric acid works. From the numerous quantitative analyses made of effluent gases escaping to atmosphere, the average of all total acidity tests was 1.06 grains (expressed as CO_2) per cubic foot, which is of the same order as the previous year's figure.

Standard Textile Shades

OF the many problems presented in any work of standardisation, those encountered in the standardisation of colours must rank as among the most formidable. For instance, paints of standardised colour would be of great assistance to the user, but some of the difficulties in the way of achieving this end are easy to imagine. Although the pigments themselves can be readily standardised, the variations produced by grinding and mixing these pigments in the different media employed by the manufacturer, together with further vagaries of shade produced by application to different surfaces, complicate the position enormously. Often, on application, one manufacturer's "sky blue" will be barely distinguishable from another's "ultramarine." In the matter of textiles, however, the problems are not so acute. At a meeting held recently under the auspices of the British Colour Council, it was pointed out that one of the chief difficulties of the dyers' trade was the duplication of shades and the unnecessarily large number of colour names employed. The object of the meeting, called by the Hosiery Dyers' and Finishers' Association, was to discuss with representatives of manufacturing, wholesale and retail houses the introduction of a standard seasonal shade card. During the discussion, the point was made that the difference in the colours was brought about by the dyers being too independent. Even the British Colour Council shades, produced for the benefit of the trade, had been found to be used by a dyer but called by different names and numbers, wholesalers adding still further to the confusion by adopting similar tactics. It was decided that an advisory committee should be set up to work with the Association in the production of a standard shade card and that it should consider a selection of twelve colours made by the British Colour Council.

Synthetic Glycerine

AS a result of increased industrial demand for glycerine in America, with production from the source of supply, namely, the soap and fatty acid industry, remaining almost constant, H. A. Levey in the News Edition of "Industrial and Engineering Chemistry" for June 10 draws attention to the necessity of finding alternative sources and reviews the methods of production available. Glycerine can be obtained from fermentable sugars, the maximum yields being given with fermentation in an alkaline medium with *p*H between 7.0 and 8.8. The process is costly, however, and fairly large quantities of secondary products are formed. The author places greater confidence in the manufacture of synthetic glycerine from propylene than in the fermentation process. Propylene is found in considerable quantity in the olefines formed in cracking petroleum oils. Propylene can be chlorinated to 1.2.3.-trichloropropane which gives glycerine directly on alkaline hydrolysis. One American oil refining plant in America has already installed equipment for this process and it is indicated that the cost of production will be about one-fifth that of the retail price at present ruling.

An Annual Report of Rubber Technology

IN publishing its first annual report on the progress of rubber technology, the Institution of the Rubber Industry has made a valuable, and most practical, addition to those volumes of annual reports, such as the Chemical Society's annual reports, which are so widely used and appreciated as presenting a condensate of developments in the technical field concerned during the year under review. This first report covers the technical and scientific advance made in 1937. It is divided into sections; as for example, planting and production of raw rubber and latex; properties, applications and utilisation of latex; synthetic rubber; testing equipment, etc.; there being twenty-four sections in all. The survey contained in each section has been prepared by an expert in that particular field (it suffices to mention F. H. Cotton, C. A. Redfarn, Dr. P. Schidrowitz, Dr. W. J. S. Naunton, Dr. R. W. West, W. N. Lister, and Dr. H. A. Daynes as representative) and the whole work is characterised by completeness, yet retaining an agreeable, succinctness in style.

Shoe Polishes and Creams

Practical Considerations affecting the Selection of Raw Materials, Formulation and Production

By
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WHATEVER type of polish is under consideration it is always well to remember that (a) the more complicated the formula the more difficult the product is to standardise and (b) the effects obtained with good quality raw materials—and particularly waxes—cannot possibly be duplicated by using inferior materials. These two points are obvious, it is true, but all too frequently they are overlooked. The chemist is either expected to make a competitive polish with cheap waxes or he himself frequently commits the error of balancing successfully a wide variety of raw materials in a laboratory formula—a method that proves to be unworkable, or at least extremely difficult to stabilise in actual works practice.

Simplicity of formula in so far as it comprises all the essential properties of a polish and the use of sound raw materials, are perhaps the two most important factors in polish production. A well-balanced wax mixture will serve not only to retain the solvent adequately, but will also leave a thin, pliable wax film on the leather, that, on buffing, readily gives a brilliant polish. But if the mixture is altered, for example, by increasing the content of the less expensive paraffins, then the preparation is debased out of all proportion to the saving in production costs.

From Blacking to Polishes

It is interesting to recall the passing of the old-fashioned blackings—a typical formula for which was as follows:—Bone black 4 lb., lampblack 1 lb., treacle 3 lb., sperm oil 10 fluid oz., sulphuric acid 5 fl. oz. and vinegar 22 fl. oz.—the ingredients being mixed together in the order given. When the variables in this formula were adequately standardised the preparation is said to have given a really good polish. Concurrent with the introduction of labour-saving devices, blacking was eventually superseded by the easier-to-use wax base polishes, forerunners of the shoe polishes, creams and waxes of the present day.

Modern shoe polishes are of various related types, i.e. (a) the waterless type, (b) the solvent-containing emulsions and (c) the emulsion type free from solvents. The basic waxes are common to all three types. Leaving for the moment further discussion of the water-containing creams, it may be noted that the simpler wax and solvent polishes are still the most popular shoe preparations in this country. They consist of a carefully graded wax mixture, selected from both natural and synthetic waxes; together with solvents and, occasionally, other ingredients such as shellac and colophony (to improve the gloss), stearine and oleine (to render the nigrosine dye completely soluble in black polishes), also various other wax and oil-soluble dyes, such as Sudan Red, Acid Phosphine, Metanil Yellow, Mandarin Yellow, Brilliant Oil Yellow and Crimson, etc., and purified bone black. It must be remembered that modern shoe polishes, and particularly certain of the brown and red-brown type, are intended to stain the leather as well as polish it

Grading of the wax base is the first and most important factor in manufacturing. The following waxes enter chiefly into consideration:—Carnauba, montan wax crude, montan wax bleached, ozokerite, candelilla, beeswax, lac wax, Japan wax, Chinese insect wax, spermaceti, bayberry wax and various synthetic waxes. These are mainly used to produce the necessary gloss, while paraffin wax and paraffin mixtures such as ceresine are required chiefly as modifiers of consistency. The wax film must at all costs remain plastic and glossy on the leather—while the wax mass must adequately bind and retain the solvent. As I remarked in my previous article on Floor Polishes (THE CHEMICAL AGE, 1937, 37, 287-289), the grading of waxes implies the correct proportional balance of carnauba with an intermediate wax such as beeswax, ozokerite or ceresine and the lower-melting paraffin. This blending is particularly essential to the production of a paste that will hold together well, without bleeding out the solvent, and is also valuable in that it makes possible much greater latitude in the cooling and packing of the product. The effect of a blend of waxes is to render possible the application of controlled cooling, thereby preventing any one wax separating itself from the others during the packing of the container. This applies equally to all polishes, whether they are intended for use on leather, metal or wood.

The previous article also referred at some length to the outstanding characteristics of carnauba, ceresine, candelilla and their mixtures. Here may be added a note on the advantages offered by crude and bleached montan wax, which in so far as shoe polishes are concerned, rank almost as high, as potential wax ingredients, as carnauba. Crude montan wax is available in dark brown and deep black grades, the latter being particularly useful in black shoe polishes. It breaks with a conchoidal fracture, is remarkably free from impurities and possesses the following characteristics:—

Melting point	81 - 83° C.
Acid number	abt. 30
Ester number	abt. 36
Saponification number	abt. 66
Solubility in ether	abt. 15%
Ashes	abt. ½%
Insolubles in benzol	abt. ½%

Bleached montan wax is available in two light yellow to light brown grades, has a crystalline fracture, faint agreeable odour and the following characteristics:—

	Type A	Type B
Melting point	74 - 75° C.	75 - 76° C.
Acid number	84 - 87	70 - 74
Ester number	3	3
Saponification number	87 - 90	73 - 77
Solubility in ether	22%	20%
Insolubles in benzol	0%	0%

Carnauba imparts the desirable ring structure on the surface of tinned shoe polish, due to the formation of myricyl alcohol crystals, a phenomenon that may also be produced by the judicious employment of bayberry wax or even montan wax, particularly if the cooling department is kept at a sufficiently low temperature.

Solvents used in shoe polishes include turpentine and turpentine substitutes such as white spirit, together with modifiers such as pine oil, camphor oil, sangajol, carbon tetrachloride, tetralin and decalin, cyclohexanol and methyl cyclohexanol. By far the most satisfactory and widely used solvent is genuine turpentine obtained from the natural viscous balsam. Also useful is wood turpentine oil, produced in America by steam distillation of pinewood. The petroleum derivatives known as turpentine substitutes are usually fractions between petrol and illuminating oil and vary in gravity from 40° to 58° Bé. A typical sample evaporated rather more rapidly than turpentine (tested on a watch glass) and had an initial boiling point of 282°F. and final b.p. of 426°F. Kerosene is also used.

Of decalin (decahydronaphthalene) and tetralin (tetrahydronaphthalene), decalin is to be preferred in shoe polishes, being more volatile, and is a useful part substitute for turpentine. These solvents may also be combined with suitable grades of benzine, and thus used to replace turpentine entirely.

When experimenting on the lines indicated above and in

the following formulæ, the marked influence of temperature changes, faults in melting the waxes and selection and blending of raw materials, etc., should all be borne in mind. A well-balanced wax mixture incorporating carnauba, ceresine and an intermediate wax, in association with turpentine, should give excellent results—the waxes being left in a pliable film on the leather and giving a high gloss when buffed. On the other hand, an ill-balanced or unduly cheapened wax mixture, coupled with heavy benzine in place of turpentine, can only give a dull, brittle, crystalloid type of film that will drag or crack when polished and cannot, in any case, impart a brilliant finish.

Shoe Polishes—Wax Type.

A.	Carnauba wax	15 lbs.
	Japan wax	10 ,,
	Paraffin wax	35 ,,
	Ozokerite, crude	40 ,,
	Colophony	5 ,,
	Nigrosine solution	about 12 ,,
	Pine oil	20 ,,
	Turpentine	300 ,,

The nigrosine solution is made up in batches of nigrosine base dissolved in oleine and thinned out with turpentine, white spirit, etc. The intensity of the solution naturally determines the exact amount required in the above formula. For a yellow or brown polish the nigrosine is replaced by a suitable dyestuff and the more refined grades of waxes used. In black polishes, lampblack or *purified* bone black may be employed. Ordinary bone black contains a high percentage of calcium phosphate and the colour obtained with it is normally a dirty brown and, therefore, unsuitable.

The procedure consists of melting, adding the dyestuff and solvent—all with continuous stirring—then cooling off gradually and filling into tins. Towards the end of the cooling process the temperature is sometimes allowed to drop suddenly, but only when solidification is nearly complete. Some manufacturers prefer to use stearine in place of the oleine, on the grounds that it helps to impart a better surface to the polish, when the latter has set in the tins. Nitrobenzene and other cheap perfuming materials may be added to mask any objectionable odour.

B.	Carnauba wax	5.0 lbs.
	Montax wax, crude	5.0 ,,
	Paraffin wax	12.0 ,,
	Stearic acid	2.5 ,,
	Nigrosine base	1.5 ,,
	White spirit	24.0 ,,
	Decalin	8.0 ,,
	Turpentine	42.0 ,,

The nigrosine is first melted with the stearic acid. The solvent mixture may be varied according to costing or climatic requirements—as may also the balance of the wax mixture.

Practical experience has shown the advisability of keeping the hard wax content rather lower than that of the paraffins and ceresine. Ozokerite is, strictly speaking, a hard wax, but does not give the gloss typical of carnauba or montan wax; its value lies chiefly in its binding power for the solvent and also for other waxes with which it is associated. In hot climates the hard wax content obviously has to be increased, and it is there that ozokerite proves particularly useful.

Emulsified Shoe Creams

These are based on waxes, emulsifying agent and water. Some contain a proportion of solvent such as turpentine, while others do not; the former are on the whole the more satisfactory, as they give a better and more easily produced gloss. The emulsifying agent is usually soap, present either through partial saponification of the saponifiable portion of the waxes used or by simple addition of ready-made curd soap. Frequently both types of soap are present in the finished polish. Triethanolamine, stearic acid, potassium carbonate, curd soap and rosin are all utilised in this connection. Wax mixtures should also be chosen, in certain cases, for their tendency to form ready and stable emulsions; for this purpose certain proprietary waxes such as the self-emulsifiable Lanette wax, Cosmolloid wax and Bayer wax III are of particular interest.

Potassium carbonate is usually preferred as an emulsifying agent to caustic alkalies or sodium carbonate, owing to the fact that it gives a better finish to the polish. Triethanolamine has, however, come to the fore in this connection during recent years.

Typical formulae are as follows:—

Shoe Cream, without Solvent.

Montan wax, crude	10.0 lbs.
Montan wax, bleached	3.0 ,,
Colophony	2.0 ,,
Paraffin wax, m.p. 50°-52° C.	2.0 ,,
Potassium carbonate	2.2 ,,
Curd soap	0.3 ,,
Borax	0.3 ,,
Nigrosine w/s	2.0 ,,
Water	95.0 ,,

The water is brought to the boil in a jacketed pan and the remaining constituents added in the following order:—Soap, borax, colophony, nigrosine, potassium carbonate and montan wax. The mass is stirred continuously until the carbon dioxide evolved through the mass thickens; it should be filled into containers immediately. If allowed to settle the waxes will tend to rise to the surface of the emulsion, while if the mixture were too efficiently emulsified the merits of the preparation as a polish would be seriously impaired. The recommended filling temperature is in the neighbourhood of 65°C.

If, instead of a black polish, a yellow or brown product is required, then the nigrosine is replaced by suitable dyes such as Mandarin yellow 0.9 per cent., together with Metanil yellow 0.8 per cent.—the montan wax crude being also entirely replaced by the bleached variety.

Shoe Cream, with Solvent.

Montan wax, crude	6.0 lbs.
Montan wax, bleached	4.0 ,,
I.G. Wax E.	2.0 ,,
Colophony	1.5 ,,
Soap	1.5 ,,
Potassium carbonate	2.0 ,,
Nigrosine w/s	2.0 ,,
Water	60.0 ,,
Turpentine	26.0 ,,

The waxes and resin are melted together and the turpentine stirred in thoroughly. The hot carbonate and soap solution, containing also the dyestuff, is then added with continued stirring.

Triethanolamine Shoe Cream.

Carnauba wax	15 lbs.
Beeswax	8 ,,
Paraffin wax	7 ,,
Turpentine	30 ,,
White spirit	20 ,,
Stearic acid	8 ,,
Triethanolamine	4 ,,
Water	65 ,,

This formula, based on one evolved by the Carbide and Carbon Chemicals Corporation, is typical of a good shoe polish of high wax content. Appropriate dyestuffs should, of course, be incorporated. Stearic acid is melted with the waxes to about 90°C. The mixed solvents are then added slowly, followed by the boiling water and triethanolamine. An alternative method is to add the latter immediately after the stearic acid and waxes have been melted together. Triethanolamine stearic polishes are extremely effective, but require hard rubbing unless the minimum amount of emulsifying agent is employed.

White Shoe Dressings

Dressings and creams for white footwear have become increasingly important during the past few years. From the chemist's point of view the chief difficulty is to evolve a preparation that will give satisfactory results both on smooth leathers like kid and rough leathers like pigskin, or on smooth canvas and coarse canvas. Liquids in bottles and creams in tubes have largely superseded the old-fashioned solid blocks of pigment. The liquids offer the advantage of being able to incorporate a higher proportion of solvent, designed to assist

in the removal of stains. The most desirable properties of a white shoe dressing are (a) it must readily provide a uniform coating on a fairly wide variety of shoe finishes, (b) it must not rub off easily, (c) it should renovate the appearance of the shoes by partially, at least, removing the stains and secondly by providing an attractive opaque white film and (d) it must be pleasant in appearance and easy to use.

Various pigments form the basis of white shoe dressings. They include lithopone, zinc oxide, whiting, talc, precipitated chalk, bismuth subnitrate, zinc sulphide, titanium pigments and magnesium salts. Colloidal, light-coloured grades ot china clay and also bentonite are useful in liquid preparations for helping to keep the other pigments in suspension; they also tend to prevent caking of the solid ingredients into a concrete-like mass.

Triethanolamine, alcohol and other water-soluble solvents may be employed—while, in the emulsified type of liquid, the usual shoe polish solvents may be used. Carbon tetrachloride is a useful cleaning agent to incorporate; while trisodium phosphate, sodium hexametaphosphate and soap are also useful cleansers. The binding agents are usually gums such as tragacanth and karaya; or may consist of shellac (solubilised with borax or ammonia), glue, glycerin, gelatin, albumen, soap, or alkali and casein. When using certain of these binding agents it is necessary to incorporate preservatives such as salicylic acid, parahydroxybenzoic acid and its esters, phenol, formaldehyde, etc.

A simple but practical type of white shoe dressing may be devised on the following lines:—

Whiting	7.0 Parts
Lithopone	10.0 ,,
Titanium pigment	3.0 ,,
Bentonite	1.4 ,,
Powdered tragacanth	0.4 ,,
Trisodium phosphate	1.0 ,,
Industrial methylated spirit	7.0 ,,
Perfume	0.1 ,,
Methyl parahydroxybenzoate	0.1 ,,
Water	70.0 ,,

The emulsion type may be based on triethanolamine oleate and may contain carbon tetrachloride and naphtha; many variations are, of course, possible.

A brief reference should, in conclusion, be made to the contribution on "The Quality Evaluation of Shoe Polishes and Cleaners," by Vladimir Tuna, pubished in the December, 1935, issue of the American "Soap" journal. Although inconclusive and rather unnecessarily involved, the description of evaluation tests is interesting. There seems no reason why British manufacturers should not also evolve practical standard tests for the evaluation of shoe polishes—based on reflection and opacity, wear and resistance of polish films, and gloss left after wetting.

Vitamin C in Foodstuffs

A New Method of Estimation

WHILE working on certain modifications of the Tillmans-Harris technique, by which a more correct estimation of the vitamin C content of the foodstuffs may be obtained, P. N. Sen Gupta and B. C. Guha, of the applied chemistry laboratory of the University College of Science, Calcutta, have devised a method by which more accurate and specific estimates of ascorbic acid are obtained. The new method consists in (1) heating the material in a suspension of water with hydrogen sulphide on a boiling water bath for 15 minutes in order to split up ascorbigen and reduce the dehydro-ascorbic acid present; (2) removing the hydrogen sulphide by a current of nitrogen or carbon dioxide; (3) extracting with trichloroacetic acid; and (4) titrating one portion with the indophenol indicator and another portion after incubation with ascorbic acid oxidase. The ascorbic acid oxidase is prepared from cucumber, or white gourd, according to *J. Biol. Chem.*, 1935, *110*, 211. The difference in titration values gives the content of ascorbic acid.

The Structure of Benzene

Internal Forces which Maintain Molecular Form

FOR many years attempts were made to explain the peculiarities of aromatic compounds by making special hypotheses relating to the benzene nucleus, said Professor C. K. Ingold, F.R.S., who delivered the Bakerian Lecture on "The Structure of Benzene," at a meeting of the Royal Society on June 16. It is a satisfactory feature of the present situation that the theory of benzene is simply a special (and specially important) case of an established general extension of valency theory, and that this extension uses essentially the same physical principles as are applied in the interpretation of valency itself. These are the postulates of the "new" quantum theory (fundamentally the principle of complementality), which provide at once a physical basis for the forces of valency.

From an experimental point of view we are concerned to establish the correct stereochemical model for benzene, and to discover, also in a quantitative way, as much as possible about the internal forces which maintain that model. Theory creates a predilection for a model of plane, regular hexagonal symmetry, because theory works out most simply if such a model be first assumed. The available experimental methods for the determination of a molecular model are (1) by X-ray or electron interferometry, (2) from rotation-vibration or vibration-electronic spectra. The interferometric method indicates the plane, regular model to a rather close degree of approximation, but the spectroscopic method, which is particularly sensitive, was at first claimed to establish a contrary conclusion.

Vibration Frequencies

For this reason, and also because the spectroscopic method, by giving vibration frequencies, supplies direct information about the internal forces, this method has been recently pursued by Angus, Bailey, Wilson and others; and it has been employed in relation not only to ordinary benzene, but also to benzenes in which a part or the whole of the hydrogen is present in the form of deuterium. This use of deuterium greatly increases the amount of information obtainable from the spectra; for isotopic substitution leaves the whole force-system of the molecule unchanged, wherefore the vibrations which are responsible for the observed frequencies can be identified by comparing the frequency shifts caused by isotopic substitution with those calculated from the known changes of atomic mass under the assumption of unaltered forces (Teller).

Four spectra have been studied: Raman scattering, infra-red absorption, ultra-violet fluorescence, and ultra-violet resonance emission. All give information concerning the molecular form and vibrations of the ground state of the molecule. Five benzenes have been examined moderately completely, whilst two others (formulæ in parentheses) are under examination: C_6H_6, C_6H_5D, 1:4—$C_6H_4D_2$, 1:3:5—$C_6H_3D_3$, (1:2:4:5—$C_6H_2D_4$), (C_6HD_5), C_6D_6.

By a comparison of frequency shifts and other spectroscopic characteristics amongst the spectra of these compounds, the frequencies of a large number of vibration-forms have been identified. From this information, with the aid of spectroscopic rules which depend ultimately on a consideration of the physical mechanism of production of the various spectra, it is possible unequivocally to establish the plane, regular model for the isolated (gaseous) benzene molecule. The previously claimed contrary indication is expained as due to the use (or accidental presence) of liquid, wherein the intermolecular forces are sufficient to deform the molecules to a spectroscopically significant extent. An approximate specification of the internal forces could be made at present, but in order to render such a specification complete with respect to harmonic forces, we require further identified frequencies, wherefore the extension involving $C_6H_2D_4$ and C_6HD_5 is necessary.

National Physical Laboratory

Some Exhibits of Interest Shown during the Annual Inspection Day

ON the occasion of the annual inspection of the National Physical Laboratory by the General Board some 1,500 scientists from all parts of Great Britain met on Tuesday afternoon at Teddington to review the work of the laboratory and the advances made during the year. The visitors were received by Sir William Bragg, O.M. (the President of the Royal Society, and Chairman of the General Board), Lord Rayleigh (Chairman of the Executive Committee), and Dr. W. L. Bragg (Director of the Laboratory). Special exhibits demonstrating the work were staged in the departments, and the laboratory was entirely thrown open to the visitors.

In the physics department there was an exhibit concerned with the determination of the thermal conductivity and latent heat of fusion of refrigerants. The apparatus shown measures the heat flow from a hot plate to a cold plate through a horizontal layer of the liquid, thin enough to avoid convection currents, in an apparatus which is entirely sealed. The flat layer of liquid is in connection with a further pool of liquid, thus eliminating the need for solid boundaries around the test layer. The whole interior is subjected to pressure slightly above the vapour pressure of the refrigerant at the temperature of the experiment, by connecting to it a reservoir of the same refrigerant maintained at a slightly higher temperature. A cover heated to the temperature of the hot plate entirely eliminates heat loss from the back of the latter, and ensures that the whole of the heat generated electrically in the hot plate flows downward through the liquid under test. The latent heat of fusion is determined by measuring the heat imparted to a calorimeter by a sample of the refrigerant, first when it is raised from just below the melting point up to the calorimeter temperature, and second when it is raised from just above the melting point to the calorimeter temperature.

Experiments carried out at the laboratory have shown that sparking produced during dry-cleaning processes may be prevented by adding to the dry-cleaning solvent a sufficient quantity of a soap to raise its conductivity to a certain level. A portable instrument for measuring the conductivities of such solvents was shown. The liquid is poured into a cell forming part of the equipment, and its conductivity is indicated on a dial. The apparatus consists essentially of a thermionic valve with a milliammeter in the anode circuit.

There was an exhibit in the metallurgy department of the apparatus and refractories used in a new chemical as opposed to the former electrolytic method of preparing pure iron. Purified ferrous chloride is decomposed by steam at a carefully regulated temperature, and the oxide so formed can be washed free from the chlorides of other metals by means of water. The dry oxide is reduced in hydrogen, and is subsequently melted, first under slightly oxidising conditions, then in hydrogen, and finally in vacuo. The melting of iron without contamination has been made possible by the use of the high frequency furnace and the production of special refractory material. Pure magnesia has been found most suitable for crucibles for the oxidising melting, and pure alumina for the final operation.

STANDARD ONE-MARK CAPILLARY PIPETTES

THE British Standards Institution has issued a further specification in the series of British Standards for scientific glassware, i.e., No. 797 for one-mark capillary pipettes. The specification follows the usual course of these specifications in specifying the sizes of pipettes, the material from which they are to be made and the construction, i.e., dimensions, finish of the top of the pipette and the finish of the jets, the graduation marks and capacity. Copies may be obtained from the British Standards Institution, 28 Victoria Street, S.W.1, price 2s. (2s. 2d. post free).

"Debt"—Sir Ernest Benn's New Book

Masterly Examination of a Subject Vitally Important to the Nation and the Individual

WITH the publication on Thursday of his new book, *Debt: Private and Public, Good and Bad* (London: Ernest Benn, Ltd., 5s.), Sir Ernest Benn has once again exhibited his outstanding faculty, almost unique among economists, of translating matters concerned with that highly involved science, economics, into a lively, interesting, and essentially readable account which can be appreciated by the general public. His earlier works, such as *Account Rendered, Honest Doubt and This Soft Age*, have already borne testimony to this unusual ability in the remarkable successes they achieved.

The present volume deals with a subject which touches upon the life of every member of the public, depressing though it may sound. The *raison d'être* of the book is the neglect in public and political work during the past twenty years of two elementary principles: first, that family finance and national finance are both subject to the same principles and governed by the same forces, and second, that a debt is a thing to be incurred with great caution and, above all, that it has to be paid. Since commerce first began, good debts, with a genuine backing represented by goods or service, have been essential to commercial transactions. Sir Ernest Benn points out that before 1914 no other type of debt existed, but since the war a new type of debt, public debt, has been introduced. It arose out of the demands of the war and has now increased to such an extent that the money market is swamped with thousands of millions of public debt for which nobody's personal credit is responsible as backing. The author holds the position to be directly traceable to the politicians' discovery of the full possibilities of borrowing and lending manipulations as initiated by the war-time emergency. "Up to 1913 the citizen was considered as the supporter of the State; since 1918 the State has been regarded as a milch cow from which the Socialists and the Planners could draw all the needs of the citizens."

The point is made that owing to political pressure the capitalist class has been nearly annihilated in raising the standard of living, largely through this modern science of lending and borrowing. This standard might have been still higher to-day had the capitalist class been allowed to function freely. Now with the public debt raised on the personal property of the ordinary individual, his improved standard of living is being destroyed by his own position as a citizen. His civic extravagance must be curtailed to safeguard his personal thrift.

Sir Ernest Benn throws out the warning that a multiplication of the public debt means depreciation of the currency. With depreciation of the currency follows the destruction of public debt and through it of private debt. Among suggestions for improving the situation, he advocates a period of rest, with no more borrowing, and during this period taxation should be held as high as possible with surpluses applied to the reduction of debt. This would bring about a return of confidence in the individual with improved trading and increased tax yield.

LIQUID VEHICLE FOR LOW TEMPERATURES

A LIQUID mixture suitable for use in obtaining very low temperatures has been patented by Brissonneau and Lotz. It consists of a mixture of trichlorethylene and dichlorethylene, the proportion of the two substances varying according to the temperature to be reached. The mixture is non-inflammable, carries temperatues as low as −80° C. and retains a practically constant viscosity down to that temperature. Moreover, the specific heat is low, about 0.22 k.cal. per kilogram, thus avoiding large applications of cooling media when the mixture is used discontinuously.

Aeroplane Fabric Dopes

Tautening Effects Obtained with Different Cellulose Derivatives

THE value of various relatively non-fire hazardous cellulose derivatives as dopes for aeroplane fabrics has been investigated by Kline and Malmberg (*J. Res. Bureau. Standards,* 1938, *20,* 651-671). The derivatives investigated were cellulose triacetate, acetobutyrate, acetopropionate, nitrate (this for comparison), and the methyl-, ethyl-, and benzyl-ethers, and also chlorinated rubber. These were tested, in a variety of solvents, for ability to tauten fabric, and to retain the tautness under atmospheric conditions.

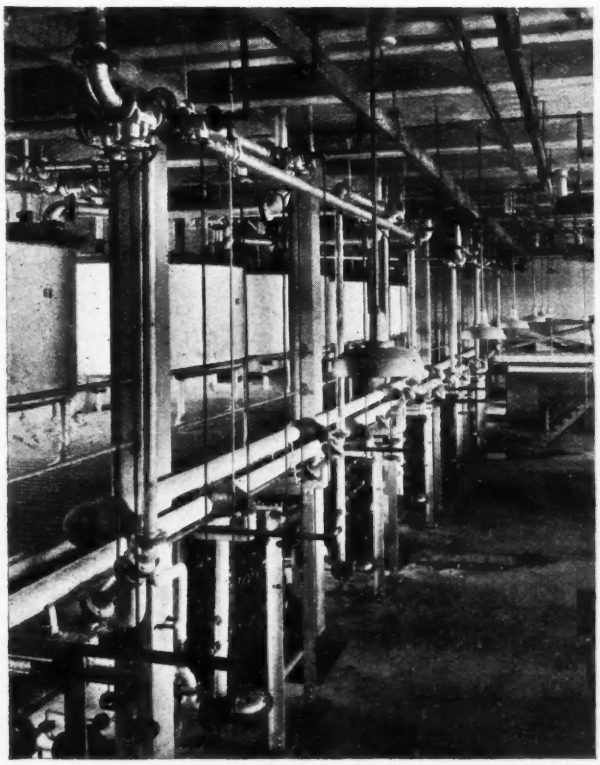
The highest tautening effect was shown by the triacetate, and the other triesters of cellulose, particularly the acetobutyrate, were found to be satisfactory. The behaviour of methyl- and ethylcelluloses was poor, and fabric treated with benzylcellulose remained slack. An extremely important factor involved in obtaining the maximum tautening effect was found to be the composition of the solvent, which should be such that there is the least possible amount of active solvent present in the film during the last stages of the drying. This ensures not only tautness, but also a non-brittle film.

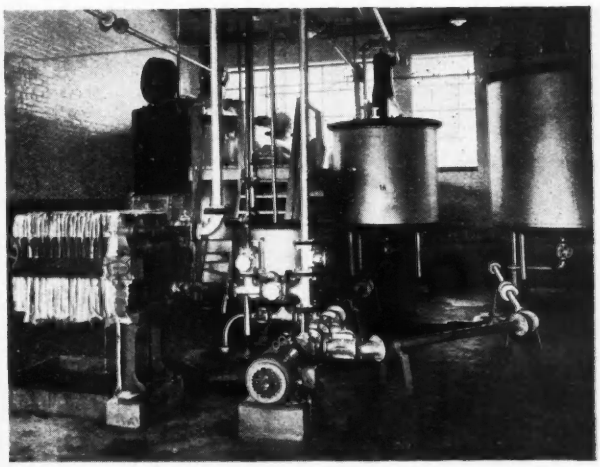
When exposed to rainy weather, the fabrics treated with cellulose acetate slackened relatively more than those treated with any other material. The behaviour of the acetopropionate was also poor; the least slackening was shown by the acetobutyrate and nitrate.

Stability of Lead Oxides

Influence of Temperature and Pressure on Composition

IN a note to the Nancy Section of the Société Chimique de France, M. Holtermann reports a study of the stability of various lead oxides at various temperatures and pressures, carried out under the direction of Professor P. Laffitte. At a pressure of 200 atmospheres of oxygen, it is stated, the composition-temperature curve presents three distinct steps, corresponding to PbO_2 (stable up to 360° C.); $4PbO_2.3PbO$ (or Pb_7O_{11}) (stable between 360° and 460° C.); and red Pb_3O_4 (stable to at least 650° C.). Above 360° C. the results are the same whether oxidation or reduction is used, but below that temperature PbO gives Pb_7O_{11}, which cannot be peroxidised, and for temperatures under about 300° C., solid solutions of PbO in Pb_7O_{11}. Moreover, the results of the oxidation of the PbO vary according to its mode of preparation and its state of division. Mixtures of red Pb_3O_4 and black Pb_7O_{11} (sometimes in solid solution with PbO) can be obtained; in this case the Pb_3O_4 must result from a reaction between Pb_7O_{11} and PbO. At pressures of less than 200 atmospheres down to about 70 atmospheres, the steps limiting the zones of stability of the above oxides exist, but are moved towards lower temperatures so that in the production of Pb_7O_{11} a region of slow reaction speeds with frequent false equilibria is found, though the formation of red Pb_3O_4 is general.





Three views of the plant of the Atlas Powder Co., Wilmington, Delaware, for the manufacture of sorbitol and mannitol. Corn sugar is dissolved in distilled water (top right), alkali added to make it electro-conductive, and pumped into the electrolytic cells (bottom right). The solution is heated during electrolytic so that it is necessary to circulate it through coolers (above) situated on the floor beneath the cells. After electrolytic reduction of the corn sugar solution, it is evaporated down and the residue extracted with alcohol. Mannitol is crystallised out of the alcohol solution by cooling; mother liquor evaporated to 85 per cent. sorbitol solution.

New Technical Books

DER GASKAMPF UND DIE CHEMISCHEN KAMPSTOFFE. By Dr. Juius Meyer. Third edition. Pp. 396. Liepzig: S. Hirzel. RM. 13.50 (paper).

International tension is undoubtedly responsible for the publication, since 1935, of three editions of this treatise on gas warfare. Some of the statistics of the last world war collected by the author are given. In 1918, Germany was turning out 600 tons of diphenyl arsine cyanide, and 1,000 tons of dichlorodiethyl sulphide per month. The French gas production during the war included 2,000 tons dichlorodiethyl sulphide, 500 tons chloropicrin, and 16,000 tons phosgene. Gases totalling 18,500 tons were exported to the Continent from England in 1917. There are chapters on the history of poison gases, shells, grenades, cylinders and other containers for gases on the battlefield, and the destructive effect of gas attack. Anti-gas measures are also treated, and photographs of the standard cheap German gasmasks and the standard protective clothing already produced for the civil population are given. The author reminds us that gasmasks are no protection against blistering substances of the dichlorodiethyl sulphide type, which penetrate through ordinary clothing with the greatest of ease.

GAS ANALYSIS. By A. McCulloch. Pp. 166. London: H. F. and G. Witherby, Ltd. 7s. 6d.

There has long been a need for a small book on gas analysis, suitable for students taking laboratory courses in fuel technology. This book has been written primarily to meet that need. The author has considered it adequate to describe the construction and manipulation of five well-known types of gas analysis apparatus which are in common use, each of which has a well-defined range of application. Chapters have been added on miscellaneous determinations and the determination of the calorific value of gases to give some completeness, and, together with matter relative to the sampling of gases and the absorbents used in gas analysis, will certainly make the book of wider service. The author is lecturer in fuels in the University of Manchester and the Manchester Municipal College of Technology.

CRYSTAL CHEMISTRY. By Charles W. Stillwell. Pp. 431. London: McGraw-Hill Publishing Co., Ltd. 25s.

The determination since 1912 of the crystal structure of literally hundreds of compounds has finally led, within the last ten years, to the discovery of the important principles governing the arrangement of atoms in crystals, and as a natural consequence systematic crystal chemistry is being evolved. This crystal chemistry is the study of the laws governing the arrangement of atoms in solids, and the influence of the arrangement and electronic structure of the atoms upon the physical and chemical properties of the solid. Although there have been many reviews published on the various phases of the structure and properties of solids, no publication has been available which presents a general picture of the subject in simple form, useful as a text or as a point of departure for a more thorough study of the field. This book, however, is intended to fill that need, with the hope that the incorporation of the ideas of crystal chemistry into the usual courses in organic chemistry may serve to revitalise the teaching of the latter subject. Opinions will naturally differ concerning the point in the chemistry curriculum at which the subject can most profitably be introduced, and an attempt has been made to arrange the book to meet this situation. The first chapter presents briefly the basic concepts of crystal chemistry and is intended for use in the introductory course in chemistry. The fundamentals outlined in this introduction are developed in greater detail in later chapters. The last two chapters concerning the structure of fibres may be read by the beginner or the advanced student, quite apart from the rest of the book. Fibrous structure is of particular technical interest because it is found in such a large variety of natural and synthetic products and exerts a significant influence on their properties. To the relatively few people specialising in crystal chemistry, this book may offer little that is new, but it provides a useful assembling of a great deal of interesting material heretofore scattered far and wide. The bibliography is not exhaustive, but reference has been made to many papers which offer good points of departure for those who wish to explore the subject in greater detail.

FEUERFESTE BAUSTOFFE SILIKATISCHER UND SILIKATHALTIGER MASSEN ("Refractory Building Materials of Silicate and Silicate-containing Bodies.") Dr. Claus Koeppel. Leipzig: Verlag von S. Hirzel.

This is a good text-book for students, but not for the scientist because, although it mentions many references in each chapter, these are not complete and in many cases are not selected according to their significance, but picked out from other points of view. The book can therefore be recommended to students who want a general view, and to engineers in the industry who are not specialists in refractories. Experts in the refractory industry can see in this book only a general view with many incomplete references. A further disadvantage is the astonishingly high percentage of printing errors which are very detrimental to the use of references.

MICROMETHODS OF QUANTITATIVE ORGANIC ELEMENATARY ANALYSIS. By Joseph B. Niederl and Victor Niederl. Pp. 271. New York: John Wiley and Sons, Inc. London: Chapman and Hall, Ltd. 15s.

This book is primarily a laboratory manual for teaching and practising the methods of quantitative organic microanalysis of pure organic compounds under ordinary laboratory conditions, and is intended principally for colleges giving a course in this subject and for organic chemical research laboratories, either industrial or academic. F. Pregl's organic microanalytical methods were introduced at New York University in 1925. As the interest in these methods increased, the teaching was gradually systematised and finally taken into the curriculum of the Graduate School in 1928. In teaching these methods within the scope of an average graduate course, F. Pregl's book "Die quantitative organische Mikroanalyse," as well as its subsequent English translations, were first used. From the standpoint of the practical research chemist, however, it appeared desirable to introduce certain changes, so that chemistry students without previous training in microchemical technique, as well as chemical laboratory technicians, could follow the procedures. In accordance with this viewpoint, shortened and concise working procedures were prepared in the form of mimeographed outlines. These outlines were revised every year until they reached the form presented in this book. Incidental to this process of adaptation, various changes and deviations of the methods from the original Pregl procedures were brought about. In contrast to the usual contents of a laboratory manual, the book contains extensive citations of the literature up to 1938, which are intended as an aid to research workers in this field who seek still further modifications or improvements of various methods. Furthermore, these citations may prove helpful to the microanalyst who wishes to consult the original literature for additional details.

"Solvents" Some Interesting Uses

THE footnote to the article of this title on page 497 of last week's issue read "From data supplied by Industrial Solvents, Ltd." Owing to a printer's error the name of the company concerned was wrongly given; it should, of course, have been "British Industrial Solvents, Ltd."

Industrial Smoke and Fume Emission

Investigations of Gaseous Effluents from Chemical Works

THE seventy-fourth annual report on Alkali, etc., Works, by the Chief Inspector, published by H.M. Stationery Office, 1s., states that the number of works registered in 1937 was 980, involving the operation of 1,835 separate processes. The totals, compared with those of last year, show an increase of two works and a decrease of 15 processes. As in previous years, sulphuric acid, chemical manure, sulphate of ammonia and tar plants show a decrease, while the number of hydrochloric acid, gas liquor and benzene plants is increased. The reduction in the number of plants does not neccessarily mean a lower production; on the contrary, centralisation more usually results in higher production. There are rather less than half the number of plants for manufacture of sulphate of ammonia than existed 10 years ago, yet the production is considerably greater. This is largely due to synthetic ammonia, but apart from this there has been a distinct tendency to install by-product units of greater capacity than formerly. Similarly, the number of tar plants has decreased by nearly 100 (in spite of the wider definition contained in the Alkali, etc., Works Order, 1928) yet the through-put of tar and the production of pitch is greater. The same remarks apply to sulphuric acid manufacture.

Increased Prosperity

The chemical trade has taken a full share of the increased prosperity which has been apparent during the past two years and which became even more manifest in the first nine months of 1937. In most branches of the industry production has reached very satisfactory levels and in quite a number new records have been set up.

Most of the complaints which have been brought to the notice of the department regarding atmospheric pollution have related to grit emission from boiler installations, coal and coke grading plants, and from the handling of pulverised fuel. But a number of complaints, apart from those of smoke, which do not fall within the scope of the Alkali Act, have been investigated.

Fumes from gum running and the boiling of linseed oil are distinctly unpleasant and suitable steps should always be taken to condense them as far as possible, treating the residual gases in such a way as to render them inoffensive. An intensive system of water washing which is now being installed at a works of this class will be observed with interest. Other means which it is thought would be effective and which might repay investigation include (*a*) electrical precipitation; (*b*) adsorption by active charcoal; (*c*) treatment with hypochlorite; and (*d*) combustion.

Un-dedusted Gas

Progress is to be reported in connection with extension of the practice of cleaning all blast furnace gas even if some of it has subsequently to be wasted by burning at a flare. But there yet remain a number of furnaces from which un-dedusted gas is allowed to escape, to the considerable detriment of the neighbourhood. The remedy is obvious and if all the gas were cleaned it is probable that an economic use for it would ensue and that less wastage would occur. The methods most commonly employed for dedusting blast furnace gas are electrical precipitation or a wet washer of the Theissen type. It is understood that a filter of metallic material has also been employed with good results.

A complaint relating to the emission of dense clouds of zinc oxide from a brass recovery works was investigated. Scrap brass is treated for the recovery of pure brass and the slag is then blown in a cupola for the recovery of copper. It is during the latter process that the zinc oxide is produced. It was recommended that either electrical precipitation or a system of bag filtration should be adopted. As no action was taken the local authority served a statutory notice and later secured a magistrate's order for abatement. It is understood that depositing flues followed by a baghouse are now being installed. This should be efficient and will, moreover, probably prove to be quite an economic investment.

This problem should not be confused with that of zinc oxide fumes arising from the melting and casting of brass. It is difficult in these cases to devise suitable means of draughting away the fumes from the melting pots and during the pouring of the molten brass. Having overcome this difficulty it would be possible to eliminate the zinc oxide but, the quantity recoverable being relatively small, it is not likely that the process could be made to pay for itself.

The tonnage of salt decomposed in 1937 was 62,750 tons in the salt-cake process and 6,140 tons in the wet copper process. Compared with those of last year, these figures show increases of 3,060 tons in the salt-cake process, and of 2,860 tons in the wet copper process.

The average of tests made in 1937 by the staff to determine the escape of hydrochloric acid from this class of work was 0.077 grain per cubic foot which may be compared with last year's figure of 0.079 grain. The overall efficiency of all salt-cake processes (on a basis of 90 per cent. NaCl in the salt used) has worked out at 97.6 per cent., individual results varying from 85.7 per cent. to 103.1 per cent.

The results are better than those of last year and show that greater care is being taken to maintain efficiency. The low result of 85.7 per cent. was at a plant the throughput of which is insignificant and, indeed, it is noticeable that the lower efficiencies are generally at the smaller plants where low level leakages have a relatively greater effect than at the larger plants with greater outputs.

Only one infraction of the statutory limit is to be recorded, where an escape of 0.22 grain was found. This followed the lighting up of a re-designed furnace and was of short duration only.

Cement Kiln Dust

Two wet copper extraction plants are now in operation, a second one having been started up during the past year. The escapes from the older works have been rather lower than in 1936. There is still, however, plenty of room for improvement.

The demand for cement continues and production has increased. The increase has occurred chiefly in those districts where complaint is most serious. The rate of installation of dust arrestment plant—often delayed by the difficulty in obtaining supplies of steel—has gained on the rate of increase of production. But for the installation of dust arrestment plant such as now exists, the situation would have been very serious indeed. Inquiry made at the close of the year showed that there were available in England and Wales 106 rotary kilns, with a total estimated capacity of 964 tons of cement per hour.

Nine new kilns of a total estimated capacity of 110 tons per hour are in course of construction. Of these, it is anticipated that seven will be fitted with electrical precipitation, one with waste heat boilers and one with internal chains and dust chamber only.

Now that the practicability of reducing dust emission to a low order has been demonstrated, it is felt that the time is approaching when a figure for the permissible concentration of dust in cement kiln effluent gases should be established. Such concentration would have to be readily attainable by the use of suitable plant and would be regarded as a standard indicating the employment of "best practicable means" as required by the Act. With a view to setting up such a standard concentration, attempts have been made to

measure dust in the discharged gases at a number of works. It is necessary that the apparatus to be used should be portable and simple and that the method used should be expeditious and capable of giving reproducible results. Extreme accuracy not being essential, it was decided to use the Fletcher's aspirator as a measuring vessel and to deposit the dust therein by shaking with water, afterwards washing out the suspension and determining the total solids by evaporation. The method is rough and ready and open to criticism, but it appears that, in most cases, a good indication of the conditions can be ascertained by this means.

The average of escapes (2.58 grains) from smelting works was a little higher than it has been in late years. In 1936 and 1935 it was 2.35 grains. The recovery of sulphur from roaster gases has progressed little beyond the experimental stage in this country. The process developed by Sulphur Patents, Ltd., whereby sulphur dioxide is absorbed in a solution of basic aluminium sulphate and is subsequently released in a concentrated state by heat has been described by Appleby (*J.S.C.I.*, 1937, *56*, 139T.), who also explained that the process could be utilised for the recovery of sulphur by employing a Swedish method according to which sulphur dioxide is passed through a bed of incandescent coke and is thereby reduced. The "Sulphidine Process" mentioned in the 73rd Report has not yet so far as is known been used in England.

Violent fluctuations in the price of spelter have occurred throughout the year, rising steeply at first and later falling back to below the level of December, 1936. There has been a good demand for pure zinc: a purity of 99.99 per cent. can now be guaranteed and the production of cadmium from zinc concentrates is stated to have become a commercial proposition. Only the Llansamlet and Avonmouth works have been in continuous production.

The use of froth flotation methods for separating pyritic material from tin ores is resulting in a decrease of the amount of material to be calcined and, in some cases, it has been found possible to dispense with calcination altogether.

Sulphuric Acid Production

The production of sulphuric acid in England and Wales during 1937 was 924,000 tons, calculated as mono-hydrate. This represents an increase of 57,000 tons over the production in 1936. It is, in fact, the highest recorded since the war. By the courtesy of the National Sulphuric Acid Association, Ltd., the following details are available:—

	1937 *Per cent.*	1936 *Per cent.*
Proportion of available plant in use ..	83·5	81
Proportion of total made in—		
(*a*) chamber plant	64·7	66·5
(*b*) contact plant	35·3	33·5

Raw materials used as a source of sulphur supply were as follows:—

	Tons.
Pyrites and anhydrite	288,000
Sulphur and H_2S	80,300
Spent oxide	149,200
Zinc ores	158,800

The system of water washing, developed at the Oldbury Works of Chance and Hunt, Ltd., has been adopted at four other works. In three instances it has been completely successful, resulting in a notable diminution of the acidity of the escaping gases, but, in the fourth case, for some reason which is yet obscure, no benefit has resulted. There is no doubt, however, that the principle of the system is sound.

The number of infractions noted when acidities have exceeded the 4 grain limit laid down in Section 6 of the Act is very much less than during last year.

The average of all escapes from contact acid plants was 3.39 grains, which is practically the same as that of last year. The proportion of the total acid which is made by the contact process, has been steadily increasing of late years. The tendency to prefer the contact system needs consideration in view of the fact that, unless some form of scrubbing is applied, the escapes are higher than those from chamber plants. Where scrubbing is practised, the bisulphite method is generally employed but the demand for this producct is limited and the means is not in all instances a practicable one to adopt. The escape is an index of the efficiency of conversion and subsequent absorption (principally the former), but, in spite of the design of convertors being continually improved and more satisfactory masses being produced, the escapes remain relatively high. Chemists both in this country and abroad are actively engaged in seeking a method whereby sulphur dioxide in low cconcentrations may be economically recovered as a saleable product.

The average of escapes from plants where no scrubbing is practised was 3.64 grains and that from plants where scrubbing is practised was 0.58 grain.

Zinc Peroxide

Treatment of Zinc Oxide with Hydrogen Peroxide

A NOTE from M. Guy Cogné to the French Academy of Sciences describes the formation of a zinc peroxide by treating hydrated zinc oxide with an excess of hydrogen peroxide at a concentration of 110 to 190 volumes. After allowing to stand for 12 hours the peroxide was decanted and replaced with a fresh quantity of reagent. A third quantity of reagent was used after a further 12 hours, and the sediment finally dried on a porous glass filter. This was washed in hydrogen peroxide of 10 volumes concentration, care being taken that this peroxide was neutral and free from all salts. This and the following washings were carried out with the liquid at 0° C. After washing with peroxide, the sediment was dehydrated, anhydrous acetone or pure alcohol being used for the purpose with a final dehydration by ether. The ether was removed by vacuum in the presence of phosphoric anhydride and active carbon.

The substance which remained gave an analysis corresponding to the formula $4\,Z^{II}O_2.Z^{II}O.2H_2O$. It is affected by air, water and heat. In a vacuum it loses 10 per cent. of its oxygen in 24 hours, while in water it forms hydrogen peroxide. In anhydrous ether, however, only active oxygen is produced, so that it was deduced that the new substance is not a mere combination of zinc oxide with hydrogen peroxide, but a true zinc peroxide.

Sugar Improvement

White Product from Coloured Canes

A SIMPLE and inexpensive process for the production of brilliant white sugar from coloured canes, is announced in the latest bulletin of the Indian Industrial Research Bureau. It is stated that "Purple Mauritius" cane has for long been extremely popular with the ryot on account of its heavy yield per acre and because by simple liming and skimming the ryot is able to obtain from it a hard jaggery of good appearance. This cane, however, has not been so popular with the sugar manufacturer, because without special treatment the sugar resulting is dark brown in colour. Were it not for this, "Purple Mauritius" would, it is claimed, be an attractive raw material for sugar manufacture.

According to V. Ramanayya research conducted on a wide scale shows that the controlled addition of aluminium hydroxide to the cane juice, after the usual liming and sulphiting operations, removes the colour entirely without decomposing the sugar. Details of an economic and practicable method of applying this process are described, and it is claimed that commercial potash alum, which sells at about half-an-anna per pound, when decomposed with lime, yields a bulky precipitate of alumina cream and on an average it has been found that only one pound of commercial alum is required per ton of cane ground.

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Sodium silicate adhesives in fibreboard. Schupp and Boller, *Ind. Eng. Chem., 30,* 603-611.

Action of dilute acids on nitrocellulose. Desmaroux, *Compt. rend., 206,* 1,483-1,484.

Solubility of denitrated nitrocelluloses. Mathieu and Petitpas, *Compt. rend., 206,* 1,485-1,486.

Vitrification of wrapping materials. *Papeterie, 60,* 442-449.

Bleaching, Dyeing, Finishing

Bleaching of straw. Sénéchal, *Text. Imp. Blanch. App., 16,* 257-263.

Thickeners for textile printing. v. Pezold, *Melliand Textilber., 19,* 516-517.

The Pechmann dyestuffs. Chovin, *Ann. Chim., 9,* 447-553.

Some natural dyestuffs. Rolland, *Teintext, 3,* 322-324.

Water repellency. Lindenmaier, *Amer. Dyestuff Reporter, 27,* P286-289.

Glass, Ceramics

Turbidity agents for glasses, glazes and enamels. Büttner, *Farben Chem., 9,* 162-169.

Talc and pyrophyllite in semivitreous bodies. Lintz, *J. Amer. Ceramic Soc., 21,* 229-237.

Determining the transformation point of glasses by measurement of viscosity. Jenckell and Schwittmann, *Glastechn. Ber., 16,* 163-170.

Chemical composition of glass for mechanical production of window glass. Schmidt, *Sprechsaal, 71,* 271-273.

Metals, Electrometallurgy

Chemical colouring and finishing of zinc. *Metallwaren Ind. u. Galvano-Techn., 36,* 247-249.

Evaluating plated coatings. Pinner and Sperry, *Amer. Electro-Platers' Soc. Monthly Rev.,* 1938, 340-352.

Nickel-plating zinc base castings and fabricated zinc. Hirsch, *Amer. Electro-Platers' Soc. Monthly Rev.,* 1938, 353-358.

Rusting processes along a scratch line on iron. Thornhill and Evans, *J.C.S.,* 1938, 614-621.

Resistance of metals to hydrochloric acid. Rabald, *Chem. Fabrik, 11,* 293-299.

Heat treatable aluminium-silicon alloys. Ganthier, *Metal Ind., 52,* 631-636.

Fats, Oils, Waxes

Transparent soaps. Fischer, *Soap. Perfum. Cosmetics, 11,* 520-524.

Bleaching in the soap plant. Kemp, *Soap, 14,* No. 6, 24-26, 75.

Conversion of stearic acid to oleic acid by catalytic dehydrogenation. Margaillan and Angeli, *Compt. rend., 206,* 1,662-1,663

Stand oil from fish oils. Meyer, *Farbe u. Lack,* 1938, No. 21, 245-246.

Paints, Pigments, Resins

Film continuity of synthetic resin coatings. Young, Gerhardt, Schneider and Seagreen, *Ind. Eng. Chem., 30,* 685-688.

Metallic lead pigments. Bennett, *Paint Techn., 3,* 153-156.

Applications of colophany. Votz, *Rev. Générale Matières Plastiques, 13,* 134-139.

Titanium dioxide: manufacture and uses. Dawson, *Fed. Paint Varnish Prod. Clubs Digest,* 1938, 225-234.

Modification of lac with higher fatty acids and their mixed glycerol esters. Bhattacharya, *Paint Varnish Prod. Manager, 18,* 188-193.

Rubber, Plastics

Celluloid in the construction of apparatus. Evans and Thornhill, *Chem. and Ind., 57,* 593-595.

Manufacture of a standard moulding casein. Delorme, *Rev. Générale Matières Plastiques, 13,* 122-126.

Resistance of rubber to soil. Tanaka, Kambara and Noto, *Kautschuk, 14,* 84-86.

Isothermal stretching of raw rubber. Hintenberger and Neumann, *Kautschuk, 14,* 77-79.

Coumarone resins and their applications. Spodheim, *Rev. Prod. Chim., 41,* 257-262.

Miscellaneous

Effect of fat in casein in the manufacture of cold adhesives. Sauer and Hagenmüller, *Kolloid Z., 83,* 210-216.

Personal Notes

SIR ROBERT PICKARD, D.Sc., Ph.D., F.R.S., has been re-elected Vice-Chancellor of London University for 1938-39.

MR. B. C. J. G. KNIGHT, of University College, London, has received the degree of D.Sc. in biochemistry.

SIR ROBERT LUDWIG MOND will receive the degree of Director of Science *honoris causa*, from London University on Foundation Day, 1938.

MR. A. MCKENDRICK, at present with United Steel Companies, Ltd., will take over the position of Scottish manager of the General Refractories group of companies on July 1.

THE LATE LT.-COL. CHAMBERS DIDHAM, chairman of Hardwick By-Products Co. and Hardwick Colliery Co and Tar Distillers, left estate valued £31,225, with net personalty £27,571.

THE PRIME MINISTER has been elected a fellow of the Royal Society under Statute 12, which provides for the election of persons who "either have rendered conspicuous service in the cause of science, or are such that their election would be of signal benefit to the Society."

MR. D. D. DOIG, director and secretary of W. and R. Hatrick, Ltd., manufacturing chemists, Glasgow, has been presented with a number of pictures by his fellow directors and the members of the staff on the occasion of his retirement. He has been with the firm since 1902.

COUNCILLOR J. J. GREEN, managing director of Williamson and Bell, oil and chemical manufacturers, Ashton-under-Lyne, has been appointed a magistrate for the Duchy of Lancaster.

MR. V. C. E. BURNOP, of the Imperial College, and MR. M. G. CHURCH, of University College, have been awarded University Post-graduate Studentships of the value of £150 for one year by the University of London. Both obtained their B.Sc. (special) with first class honours in chemistry during 1937.

MR. EDWARD MICHAEL EVANS, B.Sc., of the Imperial College, Royal College of Science, has been awarded a University Post-graduate Travelling Studentship of the value of £275 for one year by the University of London. Mr. Evans proposes to investigate the synthesis of sugars under the action of light and in the presence of various catalysts, and will work under Professor Bonhoeffer at Leipzig University.

OBITUARY

MR. ERNEST RITSON, of Davenport, Stockport, who was for many years with the Calico Printers' Association, Ltd., died on June 23, in his 67th year.

PROFESSOR RUDOLF VONDRACEK, professor of fuel technology and metallurgy at Brno Technical College, died on June 12, at the age of 57.

Foreign Chemical Notes

Bulgaria

A NEW GLASS FACTORY to be built at Rustschuk will make sheet glass and glass bottles.

Jugoslavia

AN INSULIN FACTORY IS TO BE ATTACHED to the Hygienic Institute at Agram.

Germany

A NEW TEXTILE FIBRE FROM HEMP, to be produced in a new factory in Plauen, can be spun with wool, cotton or staple fibre. The daily output will eventually reach 10 tons.

Russia

A LARGE FACTORY FOR PRODUCTION OF TITANIUM DIOXIDE, and iron sulphate as a by-product, will be erected at Czeljabinsk. Calcium carbide is to be produced in a new factory at Lipezk.

Lithuania

THE LABORATORY OF THE GOVERNMENT MEDICAL STORES at Kovno is to be enlarged with a view to the production of various therapeutic chemicals hitherto obtained from abroad.

Poland

A CENTRAL VEGETABLE EXPERIMENTAL INSTITUTE is being established by the Polish Plant Committee, to work on such problems as the quality improvement of industrial and curative plants as well as on fertilisation tests.

Czechoslovakia

THE EMPLOYMENT OF SODIUM PERBORATE, sodium bromate and persulphates as bleaching agents for flour has now been prohibited by a decree of the Health Ministry.

A NEW GLASS FACTORY to specialise in the making of glass building blocks is being built at Tischau, near Teplitz-Schönau by the Glaswerke Fischmanns Söhne A.G., of Prague.

Ten Years Back

From "The Chemical Age," June 30, 1928

Dr. H. Tropsch, of the Kaiser Wilhelm Institute for Coal Research at Mulheim-Ruhr, who has collaborated with Professor Fischer, has been appointed director of the new Coal Research Institute at Prague.

* * * *

A new synthetic fertiliser factory, to work by the Haber-Boosch method, is to be erected in Japan. It is reported that the output of the factory will be equivalent to 30,000 tons of pure nitrogen per year.

* * * *

The pyrites mines of Spain supply at present more than half of the world production. In 1926, the world production was 6.2 million tons, and that of Spain 3,305,000 tons. The most important Spanish sources are worked by the British Rio Tinto and Tharsis concerns. In Rio Tinto the daily production is 7,000 tons, of which 5,000 tons are exported, 1,000 tons wasted, and 1,000 tons worked up for the copper content.

NEW QUININE SUBSTITUTE

A PLANT for the production of a quinine substitute called acrichine has been opened in Moscow by the Soviet Pharmaceutical Trust. The exact composition of the new substance is not revealed, but in Soviet medical circles it is insisted that its efficacy is about six times that of quinine, and its use exactly similar. The production of the plant is about 45 tons per year, claimed to be equivalent to 250 tons of quinine.

LUMINESCENCE OF ZINC SULPHIDE

A METHOD of prolonging the duration of luminescence of zinc sulphide used in luminescent paints has been devised in Germany. It has been found that if the preparation of the sulphide is carried out so that it will contain about 2 per cent. of zinc oxide, this result can be attained. The method used is either to add a suitable quantity of oxide before calcining or to use an oxidising calcination method and continuing calcination for two to three hours

From Week to Week

A COAL-OIL DISTILLATION PLANT will be brought into use at the B.A. Collieries' Cinderhill (Nottingham) pit in October. The construction of the plant is in the hands of the British Coal Distillation Co. About 80 men will be engaged on the plant.

PRINCIPLES OF THE MEASUREMENT of the humidity of the air are explained in simple language by C. L. Burdick in a booklet, "The Humidity of the Air," which has been published by E. and F. N. Spon, Ltd., price 1s. Some details of cone fibre hygrometers are included.

WILLIAM BLYTHE AND CO., LTD., of Church, and John Riley and Sons, Ltd., of Hapton, chemical manufacturers, chartered two trains to convey their employees and their friends to Blackpool for their annual picnic. Gold watches were presented to four employees who have completed 40 years' service.

THE LARGEST TANK YET CONSTRUCTED in this country from "Everdur"—the copper-manganese-silicon alloy developed in Great Britain by I.C.I. Metals, Ltd.—was recently fabricated by Alexander McAra, of Dundee, for the Broughty Ferry and District Steam Laundry, Ltd. This tank, of 1,500 gallons capacity, was designed for hot water storage, and one of the requirements was stated to be "a hot water supply which can be guaranteed free from rust and corrosion products."

QUESTIONS RELATING TO RECONSTRUCTION OF THE BALANCE-SHEET of the Bleachers' Association were asked by stockholders at the annual meeting in Manchester, on June 25. The chairman, Sir Alan Sykes, said that no definite scheme was in existence and, at the moment, they had no intention of drawing up any such proposals. The directors were not unmindful of the procedure and should circumstances arise they would not hesitate to put reconstruction plans before stockholders when the time was ripe.

THE NEW WING OF QUEEN MARY COLLEGE, London, which will accommodate the arts and zoology departments, is now almost completed at a cost of £50,000, and will be available for teaching and research when the new session begins on October 4 next. Queen Mary College, which serves the population of Greater London's eastern suburbs, is being largely rebuilt and modernised at a total estimated cost of £200,000. More than £100,000 has already been spent, including £12,000 on a new chemistry department.

DURING TESTING OPERATIONS at the experimental well at Dalkeith, Scotland, belonging to the Anglo-American Oil Co., three and a half barrels of crude oil were produced on Monday. The oil came from oil sands at 1,733 ft. to 1,760 ft. below the surface. The company's engineers are not yet able to appraise the commercial significance of the discovery, and testing operations are to be continued. These will consist of swabbing and vacuum pumping, and if conditions warrant the oil sands will be shattered and opened up by exploding 100 to 200 quarts of nitro-glycerine in the well.

THE ANNUAL REPORT of the County Analyst and Bacteriologist for Worcestershire (Mr. H. E. Monk, B.Sc., F.I.C.), for the year 1937, points out that the large amounts of lime and basic slag are being bought by farmers as a result of the Government's agricultural policy announced during the year. Increased sampling of these articles has therefore been undertaken. While samples of lime can be taken by the local authority, there is not much point in so doing since, lime being a Schedule II article, only the civil provisions of the Act apply to it. In other words, in the event of a deficiency the buyer must take action himself to recover the appropriate amount.

THE CHINA CLAY STATISTICS for May show a decline of nearly 9,000 tons even on the low total for the previous month of April. Shipments for May last were only 46,474 tons, compared with 81,521 tons in May, 1937. It is true that shipping has been busier during June but not altogether satisfactory, as there can be no satisfactory return to prosperity in the china clay industry until the recession of world trade has been recovered. Fortunately, the home market remains fairly steadfast, but at the moment the acute trade depression in America and on the Continent, combined with the uncertainty in international relations is having an adverse effect on the Cornish clay industry.

THE 14TH INTERNATIONAL CONFERENCE of the International Federation for Documentation will be held at Oxford, September 21-26. The object of the meeting is to provide a platform for the discussion of the many problems involved in the task of collecting and organising the records of every branch of intellectual, technical and commercial activity. Advantage is being taken to hold joint sessions with the Association of Special Libraries and Information Bureaux. The presidential address will be given by Sir William Bragg. Mr. T. Crosbie-Walsh, editor of "Food Manufacture," will contribute a paper on "The Use of Bibliographies in the Food Industry." The making of abstracts from periodical literature will be the subject of a special session at the conference.

A STRIKE OF 800 LABOURERS in the British-owned Burmah Oil Co.'s oilfields at Syriam, began on June 26. The men are demanding better conditions of employment.

COURTAULDS, LTD., is to close down its Coventry mill at Leigh, Lancs. The machinery is to be removed to the new mill at Preston. The mill at one time employed 450 hands, but now there are only 300 working there.

WILLIAM PATERSON AND SONS (ABERDEEN), LTD., wholesale manufacturing chemists, are celebrating their centenary this year. A bonus to each employee in proportion to his or her position and length of service has also been announced.

FOLLOWING THE NON-PAYMENT of the January coupon, Dutch debenture-holders of British Bemberg, Ltd., have appointed a committee of three, which will decide on the policy to be adopted. The committee will report at the end of three months.

A PLAQUE WITH THE HEAD OF THE LATE LORD BROTHERTON, founder of Brotherton and Co., Ltd., and one time Mayor of Wakefield and Member of Parliament for that city, has been presented to the Wakefield Art Gallery by Mrs. E. McGrigor Phillips.

ONE OF THE LARGEST BLASTS ever made in this country is to be carried out at Caldon Low, Staffordshire, on July 12, when approximately 100,000 tons of limestone will be brought down by a single detonation at the Caldon Low Quarries, which are leased by the L.M.S., to Hadfields (Hope and Caldon Low Quarries), Ltd., a subsidiary of Derbyshire Stone, Ltd.

A FURTHER INCREASE IN THE ACTIVITIES of the Copper Development Association in the past year, and in the demands made by all sections of the copper-using industries upon the services it had to offer, were emphasised at the recent annual meeting, by Mr. D. Owen Evans, M.P., chairman of the council. The consumption of copper in Britain during 1937 once again established a record, having exceeded 300,000 long tons.

PRIZES TO THE VALUE OF £100 are being offered to amateur film makers by the National "Safety First" Association which will use the prize-winning efforts in its lecture campaign. Silent 16mm. films are required illustrating how exemplary or foolish conduct can prevent or cause accidents. The competition is divided into two sections, one dealing with road safety and the other with industrial safety. There are three prizes of £25, £15 and £10 in each section. Entries close on November 30, 1938.

IN VIEW OF THE AMALGAMATION PROPOSALS of Reckitt and Sons and J. and J. Colman, the property committee of the Hull Corporation has been reminded by the City Treasurer that they had a considerable holding in Reckitt and Sons in respect of Homes of Rest of which they were trustees. He was not suggesting it would make any difference in the value of their holding, but as trustees they were holding a non-trustee security, although a very good one. He considered it was his duty to draw their attention to the impending change in the management of the two companies.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Australia.—A well-established firm of agents at Sydney wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of packeting, etc., machinery for foodstuffs and drugs and proprietary pharmaceutical products for Australia. (Ref. No. 456.)

British India.—A well-established agent at Calcutta wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of soap, perfumery and toilet requisites for Bengal, Bihar, Orissa and Assam. (Ref. No. 459.)

Egypt.—The Commercial Counsellor to His Majesty's Embassy in Egypt reports that the Egyptian Ministry of Public Health is inviting tenders, to be presented in Cairo by August 9, 1938, for the supply of various types of glassware required during the year ended April 30, 1939, including the following: Flasks, dishes, beakers, funnels, test tubes, pipettes, coverslips, bottles, microscopic slides, etc., etc. Copies of the schedule of requirements and conditions of tender are available for loan to interested United Kingdom firms on application to the Department of Overseas Trade, 35 Old Queen Street, London, S.W.1. (Ref. T.Y. 23668/38.)

Copies of these documents can also be purchased from the Office of the Chief Inspecting Engineer, Egyptian Government Office, 41 Tothill Street, London, S.W.1.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

HARD ALLOYS.—British Thomson-Houston Co., Ltd. (France, June 18, '37.) 17662.

RESINOUS COMPOSITIONS.—British Thomson-Houston Co., Ltd. (United States, June 22, '37.) 17663.

PURIFICATION OF WATER.—R. Burslem. 17357.

ADHESIVES.—A. Carpmael (I. G. Farbenindustrie.) 17419.

MANUFACTURE OF RESINOUS CONDENSATION PRODUCTS.—A. Carpmael (I. G. Farbenindustrie.) 17420.

BITUMINOUS EMULSIONS.—F. J. E. China, and Burt, Boulton and Haywood, Ltd. 17260.

PURIFICATION OF PHENOLS.—A. M. Clark, and Imperial Chemical Industries, Ltd. 17345.

PRODUCTION OF VINYL-ACETYLENE.—Consortium für Elektrochemische Industrie. (Germany, June 11, '37.) 17363.

PURIFICATION OF GAS OIL.—Coppée Co. (Great Britain), Ltd., and G. Mostart. 17171.

MANUFACTURE OF CONDENSATION PRODUCTS.—Deutsche Hydrierwerke, A.-G. (Germany, June 15, '37.) 17839.

TREATMENT OF FIBROUS MATERIAL.—Deutsche Hydrierwerke, A.-G. (Germany, June 15, '37.) 17840.

DISPERSIONS OF RUBBER.—Dewey and Almy Co. (Dewey and Almy Chemical Co.). 17430.

ABSORPTION AGENTS FOR CARBONIC ACID for alkali cartridges for respiratory appliances.—O. H. Dräger. (Germany, June 15, '37.) 17794.

TREATMENT OF CELLULOSIC TEXTILE MATERIALS.—C. Dunbar, and Imperial Chemical Industries, Ltd. 17343.

FINISHING OF TEXTILE MATERIALS.—C. Dunbar, and Imperial Chemical Industries, Ltd. 17344.

ALKYL ESTERS of sulphatopoly-carboxylic acids, etc.—E. I. du Pont de Nemours and Co. (United States, June 10, '37.) 17339.

MANUFACTURE OF ADHESIVES.—E. I. du Pont de Nemours and Co. (United States, June 16, '37.) 17720.

PRODUCTION OF MAGNESIA.—Dynamidon-werk Engelhorn and Co., Ges. (Germany, June 14, '37.) 17654.

ELECTRICAL INSULATING MATERIALS.—Electrical Research Products, Inc. (United States, June 18, '37.) 17765.

REFINING OF HYDROCARBON OILS.—H. D. Elkington (Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij). 17326, 17327.

PRODUCTION, ETC., OF SYNTHETIC FATTY ACIDS.—W. A. Farenholtz, G. Hubbe, and H. Hubbe. (Germany, Aug. 25, '37.) 17341.

MANUFACTURE OF AQUEOUS, ETC., SOLUTIONS of the reaction products of phenol and formaldehyde.—J. P. Fraser. 17125.

PREPARATION OF ORGANIC BODIES.—J. P. Fraser. 17126.

MANUFACTURE OF AZO DYESTUFFS.—J. R. Geigy, A.-G. (Switzerland, June 14, '37.) 17395.

LUMINESCENT MATERIALS.—General Electric Co., Ltd., and A. H. McKeag. 17492.

PRODUCTION OF READILY-INFLAMMABLE SOLID FUELS, ETC.—M. Stinnes Gewerkschaft. (Germany, June 9, '37.) 17214.

REDUCING CHROMIUM COMPOUNDS.—Great Western Electro-Chemical Co. (United States, Aug. 3, '37.) 17857.

MANUFACTURE OF 1-METHYL-GLYCEROL.—W. W. Groves. 17293.

MANUFACTURE OF γ-CHLORO-β-ALKOXYBUTYRALDEHYDES.—W. W. Groves. 17396.

MANUFACTURE OF ALKALI ALCOHOLATES.—W. W. Groves. 17397.

MANUFACTURE OF PLASTIC MASSES.—W. W. Groves. 17398.

PRODUCTION OF FINISHINGS FAST TO WASHING.—W. W. Groves (I. G. Farbenindustrie.) 17399.

MANUFACTURE OF LACQUERS resistant to solvents.—W. W. Groves (I. G. Farbenindustrie.) 17400.

MANUFACTURE OF SAFETY GLASS.—W. W. Groves (I. G. Farbenindustrie.) 17401.

WATERPROOFING FIBROUS MATERIALS.—W. W. Groves (I. G. Farbenindustrie.) 17502.

MANUFACTURE OF CELLULOSE DERIVATIVES.—W. W. Groves (I. G. Farbenindustrie.) 17503.

MANUFACTURE OF MONO-AZO-DYESTUFFS.—W. W. Groves (I. G. Farbenindustrie.) 17504.

PREPARATION OF LACTONES.—H. Hudsdecker, H. Erlbach, and E. Vogt. (Germany, June 12, '37.) 17513; (Germany, Oct. 26, '37.) 17514.

MANUFACTURE OF AZODYESTUFFS.—I. G. Farbenindustrie. (Germany, June 9, '37.) 17216.

HEDROGENATION OF LIQUID OLEFINE POLYMERS.—International Hydrogenation Patents Co. (Germany, June 11, '37.) 17485.

TREATMENT OF ZEIN.—International Patents Development Co. (United States, Aug. 2, '37.) 17433.

PAINTING COLOURS.—G. W. Johnson (I. G. Farbenindustrie.) 17297.

MANUFACTURE, ETC., OF CONDENSATION PRODUCTS.—G. W. Johnson (I. G. Farbenindustrie.) 17298.

MANUFACTURE, ETC., OF BUTADIENE.—G. W. Johnson (I. G. Farbenindustrie.) 17540.

PRODUCTION OF SYNTHETIC RESINS.—Kodak, Ltd. (United States, June 23, '37.) 17848.

PRODUCTION OF CARBON-BLACK.—Komanditni Spolecnost J. Rütgers and E. Zamrzla. 17728.

COATED SHEET MATERIALS.—J. H. McGill, H. J. Tattersall, and Imperial Chemical Industries, Ltd. 17557.

MANUFACTURE, ETC., OF ARTIFICIAL MATERIALS.—K. Mayer and R. Haupt. 17600.

MANUFACTURE OF PAPER.—W. H. Millspaugh. 17409.

MATERIALS, ETC., FOR FINISHING SURFACES.—A. Renfrew, and Imperial Chemical Industries, Ltd. 17721.

COMPOSITIONS FOR TREATMENT OF FABRICS, ETC.—Revertex Sales Co., Ltd., and S. Whyte. 17691.

ELECTRICALLY INSULATING BODIES.—A. Reyrolle and Co., Ltd., I. W. A. Kirkwood, and P. D. Ritchie. 17605, 17606.

TREATMENT OF FIBROUS ORGANIC MATERIALS.—C. Ruzicka, and C. V. Sale. 17157.

MANUFACTURE OF HYDROGEN PEROXIDE.—A. C. Semidei (France, June 9, '37.) 17213.

MANUFACTURE OF SYNTHETIC RESINS.—Soc. des Usines Chimiques Rhone-Poulenc and S. Iavorsky. 17682.

PRODUCTION OF ASCORBIC ACID.—A. H. Stevens (Pfizer and Co.). 17642.

MANUFACTURE OF STEEL.—Stewarts and Lloyds, Ltd., and H. A. Dickie. 17317.

MANUFACTURE OF MALONIC, ETC., ESTERS.—W. J. Tennant (Sharp and Dohme, Inc.). 17338.

TREATMENT, ETC., OF SULPHITES.—Board of Trustees of University of Illinois. (United States, June 14, '37.) 17181.

COPPER-BASE ALLOYS.—Westinghouse Electric and Manufacturing Co. (United States, June 19, '37.) 17589.

PRODUCTION OF OXYKETONES.—B. P. H. Wiesner. 17841.

PRODUCTION OF PHYSIOLOGICALLY-ACTIVE COMPOUNDS.—B. P. H. Wiesner. 17842.

PREPARATION OF HORMONES.—B. P. H. Wiesner, and C. Wetzler-Ligeti. 17843.

MANUFACTURE OF STABLE IODINE-STARCH COMPOUNDS.—W. P. Williams (Schering (firm of)). 17217.

CATALYTIC DESTRUCTIVE HYDROGENATION of heavy oils, etc.—J. J. V. Armstrong (International Hydrogenation Engineering and Chemical Co.). 18213.

EXTRACTION OF SOLID CARBONACEOUS MATERIALS under pressure. J. J. V. Armstrong (International Hydrogenation Engineering and Chemical Co.). 18214.

MANUFACTURE OF CERAMIC MATERIALS.—British Thomson-Houston Co., Ltd. (Germany, June 28, '37.) 18446.

MANUFACTURE OF HIGHER FATTY ACID CHLORIDES.—A. Carpmael (I. G. Farbenindustrie.) 17984.

MANUFACTURE OF CONDENSATION PRODUCTS.—A. Carpmael (I. G. Farbenindustrie.) 18304.

METHODS OF PRESERVING SUBSTANCES OF ORGANIC ORIGIN.—A. Carpmael (I. G. Farbenindustrie.) 18479.

TREATMENT OF CARBON BLACK, ETC.—Columbian Carbon Co. (United States, June 17, '37.) 18110.

INSECTICIDAL COMPOSITIONS.—R. B. Croad. 18018.

TREATMENT OF MATERIALS containing tantalum, etc.—F. Cuvelliez, and Soc. Générale Métallurgique de Hoboken. 18226.

ELECTRODEPOSITION OF METALS.—G. Davies. 18234.

WETTABLE WATER-REPELLENT SOLID SUBSTANCES, ETC.—T. W. Dickeson. 18291.

MANUFACTURE OF CEMENT, ETC.—T. W. Dickeson. 18292.

MANUFACTURE OF COSMETICS.—T. W. Dickeson. 18293.

MEDICINALS.—T. W. Dickeson. 18294.

INSECTICIDES.—T. W. Dickeson. 18295.

POLISHING, ETC., PREPARATIONS.—T. W. Dickeson. 18296.

LUBRICANTS, ETC.—T. W. Dickeson. 18297.

AQUEOUS EMULSIONS OF WAX, ETC.—T. W. Dickeson. 18298.

MANUFACTURE OF ARTIFICIAL MATERIALS.—H. Dreyfus. 18259.

PRODUCTION OF COMPOSITIONS OF GUTTAPERCHA, ETC.—Dunlop Rubber Co., Ltd., D. F. Twiss, and R. W. Hale. 18198.

MANUFACTURE OF TANNING COMPOSITIONS.—E. I. du Pont de Nemours and Co. (United States, June 19, '37.) 17985.

MANUFACTURE OF LUBRICANTS.—E. I. du Pont de Nemours and Co. (United States, June 23, '37.) 18600.

PRODUCTION OF UREAS.—E. I. du Pont de Nemours and Co. and H. W. Arnold. 18599.

MEDIA FOR TRANSFERENCE OF HEAT.—E. I. du Pont de Nemours and Co., A. A. Levine and O. W. Cass. 18468.

MANUFACTURE OF SURFACE-ACTIVE AGENTS from abietyl alcohol. E. I. du Pont de Nemours and Co. 18084.

PAINTS, ETC.—Ericsson Telephones, Ltd., A. Brookes, and S. H. D. Ward. 18369.

PURIFICATION OF HYDROCARBONS.—Gutehoffnungshütte Oberhausen, A.-G. (Germany, Aug. 23, '37.) (Cognate with 18487.) 18488.

PURIFICATION OF HYDROCARBONS.—Gutehoffnungshütte Oberhausen, A.-G. (Germany, June 21, '37.) 18487.

PRODUCTION OF CELLULOSE DERIVATIVE COMPOSITIONS.—A. A. Houghton, and Imperial Chemical Industries, Ltd. 18466, 18467.

ALUMINIUM ALLOYS.—I. Igarashi, and G. Kitahara. 18094.

PRODUCTION OF ALKALI FERRATES, ETC.—I. G. Farbenindustrie. (Germany, July 28, '37.) 18161.

PROCESS FOR ALTERING THE SURFACE TENSION of aqueous solutions, etc.—I. G. Farbenindustrie. (Germany, June 19, '37.) 18255.

ELECTROLYTIC PRODUCTION OF ZINC.—I. G. Farbenindustrie, and Duisburger Kupferhütte. (Germany, June 21, '37.) 17972; (Germany, Aug. 17, '37.) 17973, 17974, 17975; (Germany, Aug. 18, '37.) 17976; (Germany, Sept. 7, '37.) 17977.

Specifications Open to Public Inspection

PRODUCTION OF CRYSTALLINE DEXTROSE.—International Patents Development Co. Dec. 14, 1936. 2836/37.

PLASTICISED HALOFORMED RUBBER COMPOSITIONS.—Standard Oil Development Co. Dec. 18, 1936. 28782/37.

MANUFACTURE OF MOTOR FUELS.—Standard Oil Development Co. Dec. 18, 1936. 30141/37.

PROCESS FOR THE MANUFACTURE OF CONDENSATION PRODUCTS.—I. G. Farbenindustrie. Dec. 16, 1936. 32661/37.

TREATMENT OF MATERIALS to render same resistant to oil, grease and hydrocarbons.—Atlas Powder Co. Dec. 19, 1936. 32889/37.

PROCESS FOR THE PREPARATION OF SOLID COMPOUNDS by the exothermic reaction of acid gases with alkaline gases.—Soc. des Produits Chimiques Saponifies. Dec. 15, 1936. 33034/37.

PROCESS AND MATERIAL FOR SIZING RAYON.—Luria Soc., A. R. L. Dec. 18, 1936. 33302/37.

MANUFACTURE OF SYMMETRICAL DIHYDROXYALKYLATED AMINOARSENOBENZENES.—I. G. Farbenindustrie. Dec. 19, 1936. 34374/37.

MANUFACTURE OF CONVERSION PRODUCTS of sparingly soluble to insoluble dyestuffs.—Soc. of Chemical Industry in Basle. Dec. 16, 1936. 34435/37.

PRODUCTION OF LAMP-BLACK and by-products by the decomposition of gaseous, liquid, or solid hydrocarbons.—G. Socolescu. Dec. 15, 1936. 34618/37.

PROCESS FOR THE SURFACE IMPROVEMENT OF METALS and alloys. Institut fur Physikalische Chemie der Metalle am Kaiser-Wilhelm-Institut fur Metallforschung. Dec. 14, 1936. 34633/37.

REDUCTION OF METAL OXIDES.—H. Gallusser. Dec. 16, 1936. 34726/37.

PREPARATION OF ALKALI-RESISTANT COATING COMPOSITIONS.—Beck, Koller, and Co. (England), Ltd. Dec. 17, 1936. 34893/37.

PROCESSES AND APPARATUS FOR EXTRACTING OR CONCENTRATING, by electrolysis, elements in solution or in suspension in liquids. J. W. A. Convert, and P. P. J. F. Mommen. Dec. 19, 1936. 35013/37.

IMPREGNATING AND INSULATING MATERIALS.—I. G. Farbenindustrie. Dec. 17, 1936. 35025/37.

MANUFACTURE OF SULPHURIC ACID DERIVATIVES of imidazolines. E. Waldmann, and A. Chwala. Dec. 18, 1936. 35208/37.

PRODUCTION OF FUSIBLE SOLUBLE RESINS.—I. Rosenblum. Dec. 19, 1936. 35224/37.

Specifications Accepted with Dates of Application

ALUMINIUM ALLOYS.—Vereinigte Deutsche Metallwerke, A.-G. Jan. 25, 1936. 486,946.

DYESTUFFS.—J. D. Kendall. Nov. 14, 1936. 487,051.

PRODUCTION OF NITRIC ACID and sulphuric acid.—P. Parrish. Nov. 16, 1936. 487,223.

DERIVATIVES OF SEXUAL HORMONES and of compounds containing a cyclopentano-polyhydrophenanthrene ring system, having like biological action.—A. J. H. Kongsted. Dec. 12, 1936. 487,229.

MANUFACTURE OF STABLE COLLOIDAL DISPERSIONS OF METALS.—I. G. Farbenindustrie. Dec. 18, 1935. (Sample furnished.) 487,055.

MANUFACTURE OF PLASTIC MASSES.—I. G. Farbenindustrie. Dec. 20, 1935. 487,056.

PROCESS FOR THE MANUFACTURE OF AROMATIC SULPHONAMIDE-SUBSTITUTED ANTIMONY COMPOUNDS.—A. Carpmael (I. G. Farbenindustrie.) Dec. 14, 1936. 487,233.

CONVERSION OF ALKALI METAL CHLORIDES into carbonates, and producing acetic anhydride.—A. Consalvo. Dec. 15, 1936. (Addition to 480,953.) 486,964.

MANUFACTURE OF CONDENSATION PRODUCTS.—W. W. Groves (I. G. Farbenindustrie.) Dec. 15, 1936. 487,323.

PREPARATION OF NEW SOLUBLE AROMATIC AMINO COMPOUNDS of therapeutic value.—G. B. Ellis (Soc. des Usines Chimiques Rhône-Poulenc). Dec. 15, 1936. 487,378.

METHODS OF PRODUCING WATERPROOF FABRICS permeable to air. Textilwerk Horn, A.-G. May 25, 1936. (Addition to 427,686.) 487,379.

MANUFACTURE OF VAT DYESTUFFS.—A. Carpmael (I. G. Farbenindustrie.) Dec. 15, 1936. (Samples furnished.) 487,380.

PRODUCTION OF POLYMERISATION PRODUCTS of tertiary olefines. Naamlooze Vennootschap de Bataafsche Petroleum Maatschappij. Dec. 23, 1935. 487,166.

CHLORINATED RUBBER PRODUCTS.—J. G. Moore, L. T. Dod, and Imperial Chemical Industries, Ltd. Dec. 15, 1936. 487,167.

CHLORINATED RUBBER PRODUCTS.—J. P. Baxter, L. T. Dod, B. J. Habgood, and Imperial Chemical Industries, Ltd. Dec. 15, 1936. 487,168.

DYEING SKINS OR PELTS.—I. G. Farbenindustrie. (Jan. 24, 1936.) (Addition to 440,742.) 487,239.

PURIFICATION OF COMBUSTIBLE GASES.—Ruhrgas, A.-G. Dec. 16, 1935. 486,967.

PRODUCTION OF ALIPHATIC ALCOHOLS and ethers.—Carbide and Carbon Chemicals Corporation. Dec. 24, 1935. 487,384.

PRODUCTION OF HYDROCARBONS.—Gewerkschaft Auguste. Dec. 23, 1935. 487,250.

PRODUCTION OF CELLULOSE ETHERS.—E. I. du Pont de Nemours and Co., and J. F. Haskins. Dec. 17, 1936. 486,969.

MANUFACTURE OF TRI-(4-BUTADIENYL-1.2) AMINE.—I. G. Farbenindustrie. Dec. 20, 1935. 487,337.

PRODUCING SEMI-STIFF FABRICS.—W. W. Groves (I. G. Farbenindustrie.) Dec. 19, 1936. 486,971.

PROCESS FOR THE MANUFACTURE OF LACQUER RESINS.—W. J. Tennant (Henkel and Cie, Ges.). Dec. 19, 1936. (Samples furnished.) 486,972.

MANUFACTURE OF WETTING AGENTS for mercerising lyes.—A. Carpmael (I. G. Farbenindustrie.) Dec. 21, 1936. 486,973.

MANUFACTURE OF CONDENSATION PRODUCTS.—A. Carpmael (I. G. Farbenindustrie.) Dec. 22, 1936. (Sample furnished.) 487,253.

PRODUCTION OF HEAVY WATER.—F. Hansgirg. Dec. 23, 1935. 487,066.

MANUFACTURE AND PRODUCTION OF DYESTUFFS of the phthalocyanine series.—G. W. Johnson (I. G. Farbenindustrie.) Feb. 10, 1937. 487,261.

MANUFACTURE AND PRODUCTION OF VAT DYESTUFFS.—G. W. Johnson (I. G. Farbenindustrie.) Jan. 18, 1937. 487,071.

FERROUS ALLOYS.—Cleveland Twist Drill Co. Aug. 5, 1936. (Addition to 411,321 and 469,605.) 487,254.

CONVERSION OF NORMALLY GASEOUS HYDROCARBONS.—A. L. Mond (Universal Oil Products Co.). Jan. 28, 1937. 487,255.

MANUFACTURING POROUS CONCRETE.—G. Fekete. Feb. 9, 1937. 487,259.

CHROME STEEL.—Mannesmannrohren-Werke. Feb. 12, 1936. 487,262.

SOLUBILISING CRUDE PHOSPHATES intended for fertiliser purposes.—Neunkircher Eisenwerk, A.-G. Vorm. Geb. Stumm. Feb. 17, 1936. 487,265.

PRODUCTION OF CERAMIC COLOURING MATTERS.—Deutsche Gold- und Silber-Scheideanstalt Vorm. Roessler. March 2, 1936. 487,078.

TREATMENT OF SYNTHETIC RESINS and materials containing same.—L. Robin, and M. Van. Roggen. April 1, 1936. 487,355.

PROCESS FOR THE MANUFACTURE OF β. γ-UNSATURATED KETONES of the cyclopentano-polyhydrophenanthrene series.—Schering Kahlbaum, A.-G. March 31, 1936. (Sample furnished.) 486,992.

CONVERSION OF ALKALI METAL ACETATES into bicarbonates.—Soc. International Des Industries Chimiques et Derives and A. Consalvo. April 1, 1937. 487,087.

PRODUCING COLOURED SPINNING MASSES, and shaped materials prepared therefrom.—Soc. of Chemical Industry in Basle. April 9, 1936. 487,275.

PRODUCTION OF LIQUID FUELS by destructive hydrogenation.—H. E. Potts (International Hydrogenation Patents Co., Ltd.). May 6, 1937. 486,994.

DYEING SKINS OR PELTS.—I. G. Farbenindustrie. Jan. 24, 1936. (Divided out of 487,239.) (Addition to 443,629.) 487,279.

METHODS OF PRODUCING LIGHT-IN-SENSITIVE TITANIUM PIGMENTS.—United Color and Pigment Co., Inc. June 16, 1936. 487,100.

HYDROGENATION OF ORGANIC MATERIALS.—Wingfoot Corporation. Nov. 21, 1936. 487,285.

OBTAINING HIGH STANDARD AND EASILY FILTERED CALCIUM HYPOCHLORITE.—J. Ourisson. Aug. 29, 1936. 487,009.

PRODUCTION OF CASEIN.—Naamlooze Vennootschap Onderzolkingsinstituut Research. Sept. 10, 1936. 487,115.

SACCHARISATION OF CELLULOSIC SUBSTANCES.—Naamlooze Vennootschap Internationale Suiker en Alcohol Compagnie, International Sugar and Alcohol Co., Isaco, F. Koch, and H. Koch. Sept. 7, 1937. 487,014.

METHODS FOR THE PRODUCTION OF SALTS.—Norsk Hydro-Elektrisk Kvaelstofaktieselskab. Sept. 22, 1936. 487,292.

PREPARATION OF VITAMIN CONCENTRATE.—Eastman Kodak Co. Sept. 21, 1936. 487,367.

TREATMENT OF MINERAL PHOSPHATES.—Chemische Studien-Ges. Uniwapo Ges. Dec. 9, 1936. 487,119.

MANUFACTURE OF ESTERS OF POLYSACCHARIDES.—British Celanese, Ltd. Oct. 29, 1936. 487,020.

BINDING AGENTS FOR COATINGS.—I. G. Farbenindustrie. Oct. 22, 1936. (Sample furnished.) 487,298.

EXTRACTION OF ALKALI HYDROXIDES and/or carbonates, and of alumina from alkali metal and aluminium silicates.—R. S. Opatowski, and P. Adamoli. June 12, 1936. 487,362.

HYDROCARBON OIL CONVERSION.—Naamlooze Vennootschap Nieuwe Octrooi Maatschappij. April 1, 1936. 487,205.

PURIFICATION OF BETA-PHENYLETHYL ALCOHOL.—W. J. Tennant (Dow Chemical Co.). Jan. 11, 1938. 487,038.

MAGNESIA REFRACTORIES.—E. J. Lavino and Co. Feb. 2, 1937. 487,213.

Chemical and Allied Stocks and Shares

ALTHOUGH profit-taking sales have prevented best prices from being held in the industrial section of the Stock Exchange, movements in prices have again been in favour of holders on balance for the week. There has still not been much expansion of business in the stock and share markets, and the current disposition is to await confirmation of the hopeful views current in regard to European political affairs and also indications as to the more immediate trade outlook in the United States.

Imperial Chemical have been active and at 31s. 3d. have held nearly all the advance made a week ago. Turner and Newall were also good with a rise from 78s. 3d. to 80s. 3d. at the time of writing, while there has been a strong advance in British Oxygen and also in Murex shares, which are 72s. 6d. and 81s. 10½d. respectively. British Plaster Board improved further from 27s. to 29s. 3d. in advance of the impending dividend announcement. Imperial Smelting were also better at 10s. 6d. compared with 9s. 6d. on the higher price of zinc, although as the company's year closes at the end of the month, the latter has presumably come too late to benefit the results for 1937-38. Fison Packard have been more active around 33s. 9d., aided by the current market view that, although there was no change in the interim dividend, there is a possibility of the total dividend for the year being raised to 10 per cent. Borax Consolidated at 24s. 4½d. have shown good improvement, owing to the belief that, as the company has important interests in America, it should benefit favourably if, as is hoped, there is a revival of general trade activity in the U.S.A. later in the year.

Boots Pure Drug were again higher and are 43s. 3d. at the time of writing, compared with 41s. 9d. a week ago. Associated Portland Cement show a further gain from 81s. 3d. to 82s., and London brick shares are also better at 52s. 6d., due partly to more hopeful views as to the outlook for the building trades, although the rise in share values is probably largely a reflection of the general market trend. United Molasses have moved up to 23s. and were active. Distillers, which touched 100s. at one time, are 99s. 3d. at the time of writing. The market is continuing to talk of a possible increase in the impending dividend of the latter company, although it is realised that the directors invariably follow a conservative policy and that a good proportion of the profits will probably again be placed to reserves. Courtaulds were strong and have advanced further from 34s. 9d. to 37s., sentiment being aided by the belief that conditions in the rayon trade are now rather more active and that the company may maintain its interim dividend at 3½ per cent. next month. Lansil at 9s. 9d. have held the rise which followed publication of the results. Bleachers, Bradford Dyers and most other textile shares were little changed as compared with a week ago.

Sangers have risen from 21s. 3d. to 22s. 3d. on consideration of the past year's figures, while British Glues ordinary 4s. units were steady at 5s. 9d. on the financial results, which show that the dividend of the latter company is a conservative payment. British Drug Houses were quoted at 22s. 6d. Monsanto Chemicals 5½ per cent. preference at 22s. 9d., and B. Laporte at 87s. 6d. Reckitt and Sons at 103s. 9d., and J. and J. Colman at 77s., were not much affected by the recently-published particulars of the merger company. Triplex Safety Glass have been active and have made the higher price of 40s. 9d., but Lancegaye Safety Glass were lowered to 2s. 1½d. on the reduced dividend and profits for the past year. United Glass Bottle ordinary units remained steady at 47s. 6d. Lever Bros. ordinary units fluctuated moderately around 38s.

Oil shares showed no individual features, "Shell," Anglo-Iranian and the other "leaders" in this market moved fairly closely in accordance with the day-to-day trend.

Company News

Anglo-Continental Guano Works, Ltd., have passed resolutions for increasing and reorganising the company's capital.

British Glues and Chemicals, Ltd., announce a final dividend of 10 per cent. on ordinary stock and 1 per cent. participation on preference stock for year ended April 30, payable July 31 (same).

British Oxygen Co., Ltd., are making an issue of 1,000,000 5 per cent. cumulative second preference £1 shares to finance the company's important programme of extensions, both at home and overseas, designed to meet the continued development and general expansion of the business. Arrangements have now been made for the offer of these shares to the public very shortly at the price of 22s. 6d. per share.

North British Rayon, Ltd., announce that the trading results for the year ending June 30 next do not justify the payment of the dividend on the 6 per cent. cumulative preference shares due on July 1. Of the £450,000 authorised capital, £267,500 is issued, £75,000 being in preference shares and £192,500 in ordinary shares of 10s. each. The last ordinary dividend was 6 per cent., for 1935-36. The company has also outstanding £75,000 in 6 per cent. convertible five-year notes.

Low Temperature Carbonisation, Ltd., recommend a dividend of 4 per cent., less tax, for the year ended March 31 last on the increased capital of £1,601,250. For the preceding five months 4 per cent. actual, was paid on a capital of £1,275,000. Net profits for the year amount to £67,737, compared with £37,403 for the previous period and £61,233 for the year ended October 31, 1936. Trading profits, including interest and dividends received, totalled £116,683. Depreciation absorbed £9,607 and £22,873 was required for tax and N.D.C. The carry-forward is increased from £11,149 to £32,450.

Sangers, Ltd., manufacturing chemists, announce that profit for the year to March 31, rose by £7,220, to £221,564. It is pointed out that in arriving at these profits a sum of £7,310 has been charged to profit and loss account in respect of dividend earned in a newly acquired subsidiary company. In addition, a profit of £14,750was realised on sale of shares in an associated company. The £7,000 placed to special tax reserve from the 1936-37 profits is transferred back. This year £65,381 is allowed for tax and N.D.C. and £2,000 is again allocated to staff benefit fund. Dividend on the ordinary is again 25 per cent., payable on the increased capital. A special distribution—tax free—of 1.479d. a share is to be made on the ordinary out of the £14,750 capital profit. The carry-forward, subject to accrued preference dividends for two months, is £141,792, against £119,529 brought in. Investments in subsidiary companies have been increased from £1,119,447 to £1,475,785. Stocks are up by £27,513 and cash appears at £62,424, against £109,554. A loan account appears on the liabilities side of £198,006.

Lancegaye Safety Glass (1934), Ltd., show a sharp fall in net profits of £27,209 to £14,358. Moreover, the previous year's figure was struck after allowing £452 for depreciation, placing £2,000 to bad debts reserve, £1,500 to the staff welfare fund and £1,000 to investment reserve. Trading profits declined from £36,515 to £5,531, and dividend and interest received from a subsidiary amounted to £10,114, against £11,598. Tax reserve takes £1,000, against nil. The directors recommend a final dividend of 3 per cent., making 10 per cent., less tax, for the year. In 1936-37 two interims, a final and a bonus, aggregating 24 per cent., less tax, were paid on shares issued at the dates of declaration.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

Satisfaction

BRITISH CELANESE, LTD., London, W. (M.S., 2/7/38.) Satisfaction June 21, of debenture stock registered June 21, 1934, to extent of £26,323.

County Court Judgments

GRAY KNIGHT AND CO., LTD., registered office, 33 Chancery Lane, W.C.2. (C.C., 2/7/38.) Sugar refiners. £65 13s. 10d. April 21.

THERA-DIETETIC LABORATORIES, LTD., R/O, 281 High Holborn, W.C.1. (C.C., 2/7/38.) Manufacturing chemists. £17 17s. 8d. May 23.

Companies Winding-up Voluntarily

BLACKSHAW DYEING AND FINISHING CO., LTD. (C.W.U.V., 2/7/38.) June 17 (members). G. Elder, 3 York Street, Manchester, liquidator.

Declarations of Solvency Filed

C.E.G., LTD., Cardiff, chemical manufacturers. June 14.

DIGBY TOBIAS DYEING WORKS, LTD., London, N. June 21.

HEPBURN AND CO. (DARTFORD), LTD., tanners, etc. June 21.

Weekly Prices of British Chemical Products

STEADY conditions prevail in the industrial chemical market this week and the volume of inquiry, although somewhat restricted, is rather more general than of late. So far as existing commitments are concerned deliveries are reported to be slow and fresh contract business has again been on a small scale. There are no outstanding price changes to report and quotations generally continue at recent levels with values for lead products a little firmer. A somewhat steadier undertone prevails in the market for coal tar products, although the volume of business actually transacted shows no appreciable improvement. With the commodity position in America showing signs of improvement the outlook has taken on a more optimistic note, and in some quarters a revival of confidence is anticipated by the autumn. There is practically no change in prices and quotations for most items are regarded as nominal.

MANCHESTER.—Trading conditions during the past week have been relatively quiet in most branches of the Manchester chemical market, although there has been a certain amount of additional contract buying over the second half of the year. Traders report, however, that in a number of instances, as a result of the excessive buying earlier on, consumers have still substantial quantities of chemicals against which to draw, and that at the moment delivery specifications are not circulating too well. Quotations are steady in respect of most classes of heavy chemicals. There has been no change for the better in the by-products market and buying is mostly on a hand-to-mouth scale, with prices of several products again slightly lower in consequence.

Price Changes

Rises: Copper Sulphate (Scotland).

Falls: Naphthalene, refined (Manchester); Potassium Prussiate (Scotland).

GLASGOW.—Business in chemicals has continued very quiet during the week, both for home trade and export. Prices generally continue quite steady at about last week's figures, with no important changes to report.

General Chemicals

ACETONE.—**£45 to £47 per ton.**

ACETIC ACID.—Tech, 80%, £30 5s. per ton; pure 80%, £32 5s.; tech., 40%, £15 12s. 6d. to £18 12s. 6d.; tech., 60%, £23 10s. to £25 10s. MANCHESTER: 80%, commercial, £30 5s.; tech. glacial, £42 to £46.

ALUM.—Loose lump, £8 7s. 6d. per ton d/d; GLASGOW: Ground, £10 7s. 6d. per ton; lump, £9 17s. 6d.

ALUMINIUM SULPHATE.—£7 2s. 6d. per ton d/d Lancs. GLASGOW: £7 to £8 ex store.

AMMONIA, ANHYDROUS.—Spot, 1s. to 1s. 1d. per lb. d/d in cylinders. SCOTLAND: 10½d. to 1s. 0½d., containers extra and returnable.

AMMONIA, LIQUID.—SCOTLAND: 80°, 2½d. to 3d. per lb., d/d.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey galvanising, £19 per ton, ex wharf.

AMMONIUM CHLORIDE (MURIATE).—SCOTLAND: British dog tooth crystals, £32 to £35 per ton carriage paid according to quantity. (See also Salammoniac.)

AMMONIUM DICHROMATE.—8¼d. per lb. d/d U.K.

ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—Continental material £11 per ton c.i.f., U.K. ports; Cornish White, £12 5s. to £12 10s. per ton f.o.r., mines, according to quantity. MANCHESTER: White powdered Cornish, £16 10s. per ton, ex store.

BARIUM CHLORIDE.—£11 10s. to £12 10s. per ton in casks ex store. GLASGOW: £11 10s. per ton.

BLEACHING POWDER.—Spot, 35/37%, £9 5s. per ton in casks, special terms for contracts. SCOTLAND: £9 per ton net ex store.

BORAX COMMERCIAL.—Granulated, £16 per ton; crystal, £17; powdered, £17 10s.; extra finely powdered, £18 10s., packed in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Granulated, £16, crystal, £17; powdered, £17 10s. per ton in 1-cwt. bags, carriage paid.

BORIC ACID.—Commercial granulated, £28 10s. per ton; crystal, £29 10s.; powdered, £30 10s.; extra finely powdered, £32 10s. in 1-cwt. bags, carriage paid home to buyers' premises within the United Kingdom in 1-ton lots. GLASGOW: Crystals, £29 10s.; powdered, £30 10s. 1-cwt. bags in 1-ton lots.

CALCIUM BISULPHITE.—£6 10s. per ton f.o.r. London.

CHARCOAL, LUMP.—£6 to £6 10s. per ton, ex wharf. Granulated, £7 to £9 per ton according to grade and locality.

CHLORINE, LIQUID.—£18 15s. per ton, seller's tank wagons, carriage paid to buyer's sidings; £19 5s. per ton, d/d in 16/17 cwt. drums (3-drum lots); £19 10s. per ton d/d in 10-cwt. drums (4-drum lots); 3½d. per lb. d/d station in 70-lb. cylinders (1-ton lots).

CHROMETAN.—Crystals, 2½d. per lb.; liquor, £9 10s. per ton d/d station in drums. GLASGOW: 70/75% solid, £5 15s. per ton net ex store.

CHROMIC ACID.—10d. per lb., less 2½%; d/d U.K.

CHROMIC OXIDE.—11d. per lb.; d/d U.K.

CITRIC ACID.—1s. 0¼d. per lb. MANCHESTER: 1s. 0¼d. SCOTLAND: B.P. crystals, 1s. 0¼d. per lb.; less 5%, ex store.

COPPER SULPHATE.—£21 7s. 6d. per ton, less 2% in casks. MANCHESTER: £17 15s. per ton f.o.b. SCOTLAND: £18 10s. per ton, less 5%, Liverpool, in casks.

CREAM OF TARTAR.—100%, 92s. per cwt., less 2½%. GLASGOW: 99%, £4 12s. per cwt. in 5-cwt. casks.

FORMALDEHYDE.—£20-£22 per ton.

FORMIC ACID.—85%, in carboys, ton lots, £42 to £47 per ton.

GLYCERINE.—Chemically pure, double distilled, 1.260 s.g., in tins, £4 2s. 6d. to £5 2s. 6d. per cwt. according to quantity; in drums, £3 15s. 0d. to £4 7s. 6d.

HYDROCHLORIC ACID.—Spot, 5s. 6d. to 8s. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 6s. 4d. per lb. in 7 lb. lots.

LACTIC ACID.—(Not less than ton lots). Dark tech., 50% by vol., £24 10s. per ton; 50% by weight, £28 10s.; 80% by weight, £50; pale tech., 50% by vol., £28; 50% by weight, £33; 80% by weight, £55; edible, 50%, by vol., £41. One-ton lots ex works, barrels free.

LEAD ACETATE.—LONDON: White, £31 10s. ton lots; brown, £35. GLASGOW: White crystals, £30; brown, £1 per ton less. MANCHESTER: White, £30; brown, £29.

LEAD, NITRATE.—£32 per ton for 1-ton lots.

LEAD, RED.—£30 15s. 0d. 10 cwt. to 1 ton, less 2½% carriage paid. SCOTLAND: £30 per ton, less 2½% carriage paid for 2-ton lots.

LITHARGE.—SCOTLAND: Ground, £30 per ton, less 2½%, carriage paid for 2-ton lots.

MAGNESITE.—SCOTLAND: Ground calcined, £9 per ton, ex store.

MAGNESIUM CHLORIDE.—SCOTLAND: £7 5s. per ton.

MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf.

MERCURY.—Ammoniated B.P. (white precip.), lump, 5s. 10d. per lb.; powder B.P., 6s. 0d.; bichloride B.P. (corros. sub.) 5s. 1d.; powder B.P. 4s. 9d.; chloride B.P. (calomel), 5s. 10d.; red oxide cryst. (red precip.), 6s. 11d.; levig. 6s. 5d.; yellow oxide B.P. 6s. 3d.; persulphate white B.P.C., 6s. 0d.; sulphide black (hyd. sulph. cum sulph. 50%), 5s. 11d. For quantities under 112 lb., 1d. extra; under 28 lb., 5d. extra.

METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities. SCOTLAND: Industrial 64 O.P., 1s. 9d. to 2s. 4d.

NITRIC ACID.—Spot, £25 to £30 per ton according to strength, quantity and destination.

OXALIC ACID.—£48 15s. to £57 10s. per ton, according to packages and position. GLASGOW: £2 9s. per cwt. in casks. MANCHESTER: £49 to £55 per ton ex store.

PARAFFIN WAX.—SCOTLAND: 3¾d. per lb.

POTASH CAUSTIC.—Solid, £35 5s. to £40 per ton according to quantity, ex store; broken, £42 per ton. MANCHESTER: £38 10s.

POTASSIUM CHLORATE.—£36 7s. 6d. per ton. GLASGOW: 4¼d. per lb. MANCHESTER: £37 per ton.

POTASSIUM DICHROMATE.—5¼d. per lb. carriage paid. SCOTLAND: 5¼d. per lb., net, carriage paid.

POTASSIUM IODIDE.—B.P. 5s. 6d per lb. in 7 lb. lots.

POTASSIUM NITRATE.—Small granular crystals, £24 to £27 per ton ex store, according to quantity. GLASGOW: Refined granulated, £29 per ton c.i.f. U.K. ports. Spot, £30 per ton ex store.

POTASSIUM PERMANGANATE.—LONDON: 9¾d. per lb. SCOTLAND: B.P. Crystals, 9¾d. MANCHESTER: B.P. 10¾d. to 11¼d.

POTASSIUM PRUSSIATE.—6¼d. per lb. SCOTLAND: 6¾d. net, in casks, ex store. MANCHESTER: Yellow, 6¼d. to 6½d.

PRUSSIATE OF POTASH CRYSTALS.—In casks, 6¾d. per lb. net, ex store.

SALAMMONIAC.—Firsts lump, spot, £42 17s. 6d. per ton, d/d address in barrels. Dog-tooth crystals, £36 per ton; fine white crystals, £18 per ton, in casks, ex store. GLASGOW: Large crystals, in casks, £37 10s.

SALT CAKE.—Unground, spot, £3 11s. per ton.
SODA ASH.—58% spot, £5 17s. 6d. per ton f.o.r. in bags.
SODA, CAUSTIC.—Solid, 76/77° spot, 13s. 10s. per ton d/d station. SCOTLAND: Powdered 98/99%, £18 10s. in drums, £19 5s. in casks, Solid 76/77° £15 12s. 6d. in drums; 70/73%, £15 12s. 6d., carriage paid buyer's station, minimum 4-ton lots; contracts, 10s. per ton less.
SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.
SODIUM ACETATE.—£19-£20 per ton carriage paid North. GLASGOW: £18 10s. per ton net ex store.
SODIUM BICARBONATE.—Refined spot, £10 15s. per ton d/d station in bags. GLASGOW: £13 5s. per ton in 1 cwt. kegs, £11 5s. per ton in 2-cwt. bags. MANCHESTER: £10 10s.
SODIUM BISULPHITE POWDER.—60/62%, £20 per ton d/d 1 cwt. iron drums for home trade.
SODIUM CARBONATE MONOHYDRATE.—£20 per ton d/d in minimum ton lots in 2 cwt. free bags.
SODIUM CHLORATE.—£27 10s. to £32 per ton. GLASGOW: £1 11s. per cwt., minimum 3 cwt. lots.
SODIUM DICHROMATE.—Crystals cake and powder 4¼d. per lb. net d/d U.K. with rebates for contracts. MANCHESTER: 4d. per lb. GLASGOW: 4¼d. net, carriage paid.
SODIUM CHROMATE.—4¼d. per lb. d/d U.K.
SODIUM HYPOSULPHITE.—Pea crystals, £15 5s. per ton for 2-ton lots; commercial, £11 5s. per ton. MANCHESTER: Commercial, £11; photographic, £15 10s.
SODIUM METASILICATE.—£14 5s. per ton, d/d U.K. in cwt. bags.
SODIUM NITRATE.—Refined, £8 per ton for 6-ton lots d/d. GLASGOW: £1 12s. 0d. per cwt. in 1-cwt. kegs, net, ex store.
SODIUM NITRITE.—£18 5s. per ton for ton lots.
SODIUM PERBORATE.—10%, 9½d. per lb. d/d in 1-cwt. drums.
SODIUM PHOSPHATE.—Di-sodium, £12 per ton delivered for ton lots. Tri-sodium, £15 to £16 per ton delivered per ton lots.
SODIUM PRUSSIATE.—4d. per lb. for ton lots. GLASGOW: 5d. to 5½d. ex store. MANCHESTER: 4¼d. to 5¼d.
SODIUM SILICATE.—£8 2s. 6d. per ton.
SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.
SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. SCOTLAND: Ground quality, £3 5s. per ton d/d. MANCHESTER: £3 12s. 6d.
SODIUM SULPHIDE.—Solid 60/62%, Spot, £11 15s. per ton d/d in drums; crystals, 30/32%, £9 per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62%, £11; commercial, £8 10s.
SODIUM SULPHITE.—Pea crystals, spot, £14 10s. per ton d/d station in kegs.
SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.
SULPHURIC ACID.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.
TARTARIC ACID.—1s. 1¼d. per lb. less 5%, carriage paid for lots of 5 cwt. and upwards. MANCHESTER: 1s. 1¼d. to 1s. 1½d. per lb. GLASGOW: 1s. 1d. per lb., 5%, ex store.
ZINC SULPHATE.—Tech., £11 10s. f.o.r., in 2 cwt. bags.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 7d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 6d. to 1s. 7½d. per lb.
ARSENIC SULPHIDE.—Yellow, 1s. 5d. to 1s. 7d. per lb.
BARYTES.—£6 to £6 10s. per ton, according to quality.
CADMIUM SULPHIDE.—4s. to 4s. 3d. per lb.
CARBON BLACK.—3½d. to 3 15/16d. per lb., ex store.
CARBON DISULPHIDE.—£31 to £33 per ton, according to quantity, drums extra.
CARBON TETRACHLORIDE.—£41 to £46 per ton, according to quantity, drums extra.
CHROMIUM OXIDE.—Green, 10½d. to 11d. per lb.
DIPHENYLGUANIDINE.—2s. 2d. per lb.
INDIA-RUBBER SUBSTITUTES.—White, 4½d. to 5½d. per lb.; dark 3½d. to 4½d. per lb.
LAMP BLACK.—£24 to £26 per ton del., according to quantity. Vegetable black, £35 per ton upwards.
LEAD HYPOSULPHITE.—9d. per lb.
LITHOPONE.—Spot, 30%, £16 10s. per ton, 2-ton lots d/d in bags.
SULPHUR.—£9 to £9 5s. per ton. SULPHUR PRECIP. B.P., £55 to £60 per ton. SULPHUR PRECIP. COMM., £50 to £55 per ton.
SULPHUR CHLORIDE.—5d. to 7d. per lb., according to quantity.
VERMILION.—Pale, or deep, 4s. 9d. per lb., 1-cwt. lots.
ZINC SULPHIDE.—£58 to £60 per ton in casks ex store, smaller quantities up to 1s. per lb.

Nitrogen Fertilisers

AMMONIUM SULPHATE.—The following prices have been announced for neutral quality basis 20.6% nitrogen, in 6-ton lots delivered farmer's nearest station up to June 30, 1938: November, £7 8s.; December, £7 9s. 6d.; January, 1938, £7 11s.; February, £7 12s. 6d.; March/June, £7 14s.
CALCIUM CYANAMIDE.—The following prices are for delivery in 5-ton lots, carriage paid to any railway station in Great Britain up to June 30, 1938: November, £7 10s.; December, £7 11s. 3d.; January, 1938, £7 12s. 6d.; February, £7 13s. 9d.; March, £7 15s.; April/June, £7 16s. 3d.
NITRO CHALK.—£7 10s. 6d. per ton up to June 30, 1938.
SODIUM NITRATE.—£8 per ton for delivery up to June 30, 1938.
CONCENTRATED COMPLETE FERTILISERS.—£11 4s. to £11 13s. per ton in 6-ton lots to farmer's nearest station.
AMMONIUM PHOSPHATE FERTILISERS.—£10 19s. 6d. to £14 16s. 6d. per ton in 6-ton lots to farmer's nearest station.

Coal Tar Products

BENZOL.—At works, crude, 9½d. to 10d. per gal.; standard motor, 1s. 3d. to 1s. 3½d.; 90%, 1s. 4d. to 1s. 4½d.; pure, 1s. 8d. to 1s. 8½d. GLASGOW: Crude, 10d. to 10½d. per gal.; motor, 1s. 4d. to 1s. 4½d. MANCHESTER: Pure, 1s. 7d. to 1s. 8d. per gal.; crude, 11d. to 1s. per gal.
CARBOLIC ACID.—Crystals, 7½d. to 8½d. per lb., small quantities would be dearer; Crude, 60's, 2s. 9d. to 3s.; dehydrated, 3s. to 3s. 3d. per gal. MANCHESTER: Crystals, 7½d. per lb. f.o.b. in drums; crude, 2s. 3d. per gal.
CREOSOTE.—Home trade, 5d. per gal., f.o.r. makers' works; exports, 6¼d. to 6¾d. per gal., according to grade. MANCHESTER: 4½d. to 5½d. GLASGOW: B.S.I. Specification, 6d. to 6¼d. per gal.; washed oil, 5d. to 5½d.; lower sp. gr. oils 5¾d. to 6¼d.
CRESYLIC ACID.—97/99%, 2s. to 2s. 3d.; 99/100%, 3s. 6d. to 5s. 6d. per gal., according to specification; Pale, 99/100%, 2s. 4d. to 2s. 7d.; Dark, 95%, 1s. 8d. to 1s. 10d. per gal. GLASGOW: Pale, 99/100%, 5s. to 5s. 6d. per gal.; pale, 97/99%, 4s. 6d. to 4s. 10d., dark, 97/99%, 4s. 3d. to 4s. 6d.; high boiling acids, 2s. to 2s. 6d. American specification, 3s. 9d. to 4s. MANCHESTER: Pale, 99/100%, 2s. 6d.
NAPHTHA.—Solvent, 90/160, 1s. 6d. to 1s. 7d. per gal.; solvent, 95/160%, 1s. 7d. to 1s. 8d., naked at works; heavy 90/190%, 1s. 1d. to 1s. 3d. per gal., naked at works, according to quantity. GLASGOW: Crude, 6½d. to 7¼d. per gal.; 90%, 160, 1s. 5d. to 1s. 6d., 90%, 190, 1s. 1d. to 1s. 3d.
NAPHTHALENE.—Crude, whizzed or hot pressed, £5 5s. to £6 5s. per ton; purified crystals, £11 10s. per ton in 2-cwt. bags. LONDON: Fire lighter quality, £5 to £6 per ton. GLASGOW: Fire lighter, crude, £6 to £7 per ton (bags free). MANCHESTER: Refined, £14 10s. per ton f.o.b.
PITCH.—Medium, soft, 33s. per ton, f.o.b. MANCHESTER: 32s. 6d. f.o.b., East Coast. GLASGOW: f.o.b. Glasgow, 35s. to 37s. per ton; in bulk for home trade, 35s.
PYRIDINE.—90/140%, 13s. 6d. to 15s. per gal.; 90/160%, 10s. 6d. to 13s. 3d. per gal.; 90/180%, 3s. 3d. to 4s. per gal. f.o.b. GLASGOW: 90% 140, 10s. to 12s. per gal.; 90% 160, 9s. to 10s.; 90% 180, 2s. 6d. to 3s. MANCHESTER: 10s. to 11s. per gal.
TOLUOL.—90%, 1s. 10d. per gal.; pure, 2s. 2d. GLASGOW: 90%, 120, 1s. 10d. to 2s. 1d. per gal.
XYLOL.—Commercial, 1s. 11d. to 2s. per gal.; pure, 2s. 3d. to 2s. 3½d. GLASGOW: Commercial, 2s. to 2s. 1d. per gal.

Wood Distillation Products

CALCIUM ACETATE.—Brown, £7 5s. to £9 15s. per ton; grey, £9 5s. to £9 15s. MANCHESTER: Brown, £8 10s.; grey, £10.
METHYL ACETONE.—40.50%, £35 to £40 per ton.
WOOD CREOSOTE.—Unrefined, 4d. to 6d. per gal., according to boiling range.
WOOD NAPHTHA, MISCIBLE.—3s. 3d. to 3s. 6d. per gal.; solvent, 3s. 6d. to 3s. 9d. per gal.
WOOD TAR.—£2 to £8 per ton, according to quality.

Intermediates and Dyes

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZIDINE, HCl.—2s. 7½d. per lb., 100% as base, in casks.
BENZOIC ACID, 1914 B.P. (ex toluol).—1s. 11½d. per lb. d/d buyer's works.
m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.
o-CRESOL 30/31° C.—6½d. to 7½d. per lb. in 1-ton lots.
p-CRESOL, 34-5° C.—1s. 7d. to 1s. 8d. per lb. in ton lots.
DICHLORANILINE.—2s. 1½d. to 2s. 5½d. per lb.
DIMETHYLANILINE.—Spot, 1s. 7½d. per lb., package extra.
DINITROBENZENE.—8½d. per lb.
DINITROCHLORBENZENE, SOLID.—£79 5s. per ton.
DINITROTOLUENE.—48/50° C., 9½d. per lb.; 66/68° C., 11d.
DIPHENYLAMINE.—Spot, 2s. 2d. per lb., d/d buyer's works.
GAMMA ACID, Spot, 4s. 4½d. per lb. 100% d/d buyer's works.
H ACID.—Spot, 2s. 7d. per lb.; 100% d/d buyer's works.
NAPHTHIONIC ACID.—1s. 10d. per lb.
β-NAPHTHOL.—£97 per ton; flake, £94 8s. per ton.
α-NAPHTHYLAMINE.—Lumps, 1s. 1d. per lb.
β-NAPHTHYLAMINE.—Spot, 3s. per lb.; d/d buyer's works.
NEVILLE AND WINTHER'S ACID.—Spot, 3s. 3½d. per lb. 100%.
o-NITRANILINE.—4s. 3½d. per lb.
m-NITRANILINE.—Spot, 2s. 10d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 10d. to 2s. 3½d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 4½d. to 5d. per lb., in 90-gal. drums, drums extra. 1-ton lots d/d buyer's works.
NITRONAPHTHALENE.—10½d. per lb.; P.G., 1s. 0½d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.
SULPHANILIC ACID.—Spot, 8¾d. per lb. 100%, d/d buyer's works.
o-TOLUIDINE.—11½d. per lb., in 8/10-cwt. drums, drums extra.
p-TOLUIDINE.—2s. per lb., in casks.
m-XYLIDINE ACETATE.—4s. 8d. per lb., 100%.

CLASSIFIED SECTION

NOTE: Trade announcements, other than strictly second-hand and job lines, cannot be inserted in these pages except by firms whose advertisements run in the display columns

APPOINTMENTS VACANT

(2d. per word; minimum 18 words; 3 or more insertions, 1½d. per word per insertion. Sixpence extra is charged when replies are addressed to box Numbers.)

LONDON COUNTY COUNCIL—Temporary chemist required. Rate of pay according to qualifications and experience (not exceeding £5 a week). Candidates must possess a University degree in chemistry or equivalent qualification and must have had experience of general analytical work. Applications (in letter form) stating date and place of birth, qualifications and experience, and enclosing copies of testimonials (stamped addressed foolscap envelope) should be addressed to Medical Officer of Health (S.D.5), County Hall, Westminster Bridge, S.E.1, to reach him by July 9. Canvassing disqualifies.

FOR SALE

(2d. per word; minimum 18 words; 3 or more insertions, 1½d. per word per insertion. Sixpence extra is charged when replies are addressed to box Numbers.)

CHARCOAL, ANIMAL, and VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating, also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill-Jones, Bochurch, London." Telephone: 3285 East.

STEAM Jacketed Copper Pan, 6 ft. diam. by 5 ft. deep, bottom outlet, and mounted on legs, £75; Copper Jacketed Mixer, 36 in. diam. by 24 in. deep, fitted Agitating Gear, belt drive, £40; Copper Jacketed Still, 24 in. diam. by 30 in. deep, with dome, swan neck, sight glasses, etc.; also suitable Vacuum Pump, £50; Copper Jacketed Vacuum Pan, 30 in. diam. by 30 in. deep, fitted Agitating Gear, belt driven, dome removed by balance weights, also fitted trunnions for tilting, £40. C. F. DAVIS, LTD., 60 Hatcham Road, Old Kent Road, S.E.15. New Cross 1147.

SEE BARBERS' FOR CHEMICAL PLANT
of all descriptions. 'Phone or write:—
C. BARBER, LIMITED, Chemical Engineers,
Silverdale Gardens, Hayes, Middlesex.
'Phone: Hayes, Middlx. 735. 'Grams: "Barchem," Hayes, Middx.

TWELVE first-class 4 in. Flanged Steam Circular Coils. Approx. 9 ft. diameter by 75/100 ft. Piping Per Coil. MADEN AND MCKEE, LTD., 317 Prescot Road, Liverpool.

'Phone 98 Staines.

42 IN. Watson Laidlaw Hydro Extractor, bottom discharge: Lilleshall Thorough Washing Filter Press, 24 Chambers, 24 in. square: Riveted Steel Jacketed Mixer, 6 ft. 6 in. by 5 ft.: Hind and Lund Jacketed Dryer, 6 ft. by 3 ft. by 3 ft.
HARRY H. GARDAM AND CO., LTD., STAINES.